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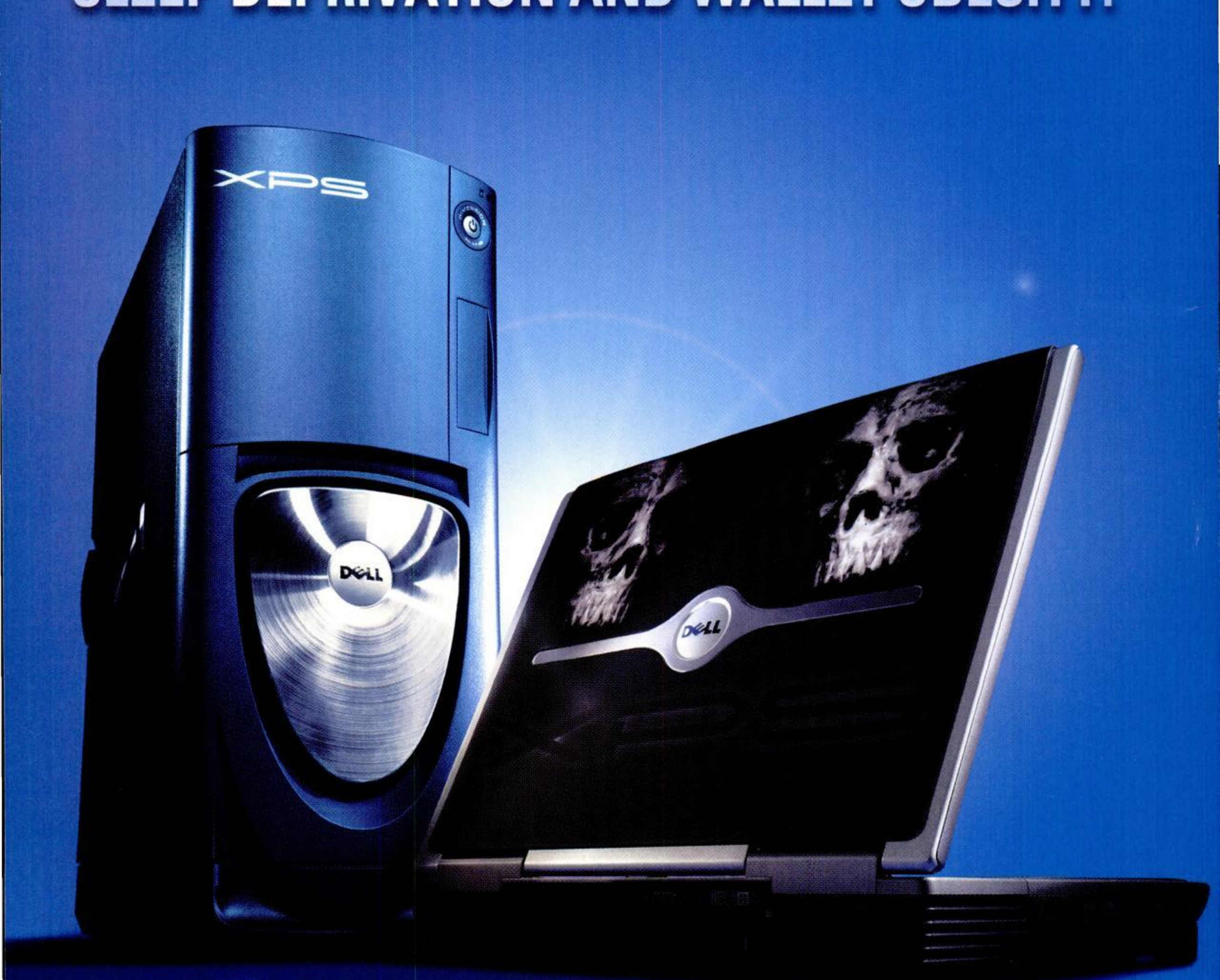
POWER SUPPLIES: HOW THEY WORK AND HOW TO PICK THE BEST ONE

THE NEW DELL XPS GAMING PCs. SIDE EFFECTS MAY INCLUDE FRIED BRAIN, SLEEP DEPRIVATION AND WALLET OBESITY.



Inspiron XPS Notebook shown with Skullz design option.

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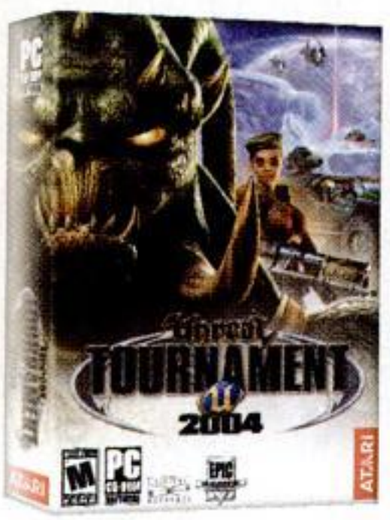

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Release Notes

Speed Saves You Money

I can think of few better examples of the human ability to adapt and evolve than the rate at which computers become obsolete in this world. It's uncanny, and the phenomenon affects power users and newbies alike. We build, buy, or set up a new computer, and are initially amazed at how fast it boots. We become giddy at how much faster our games run. We marvel at how much faster our apps open. For one brief moment, our PC is actually faster than us.

But as sure as time marches on, the rate at which our systems boot and launch applications feels slower and slower. And slower. Eventually, we're moving faster than our PCs can react to us. Repeat this every two years, and... well, there you have your monthly *Maximum PC* reader. As I write this, it's hard for me to believe that more than 10 years ago, my 66MHz 486 felt fast. For at least four months, this humble system—one of my all-time favorites—kept up with my every word processing demand and gaming desire. Then it let me down. Just like all the rest.

Why the slowdown? Undoubtedly, part of it's caused by the constant, ongoing degradation of Windows XP. As our hard drives become more and more cluttered with junk, it's inevitable that our PCs slow down a bit. This is why we recommend performing a new, clean installation of your OS every year or so or after a major hardware upgrade. It cleans the digital gunk out of your system, and restores it to a pristine state.

But the biggest reason for the slowdown is that over time, we actually adapt to the speed of our new system, and then surpass it. Put another way, our fast PCs quickly become slow because we become faster. I guess this is a small trade-off for human beings' remarkable and highly evolved ability to rapidly adapt to circumstances, environments, and tasks.

This is why speed and performance upgrades are so important to us. This is also why, for the third year in a row, we've devoted a huge chunk of *Maximum PC* to testing and identifying the fastest CPUs, videocards, drives, and even cables. The faster your PC and its components are when you buy them, the longer it takes for your mind and fingers to catch up. Which means the longer you're happy with your rig. Which means the less money you'll spend.

Got it?

—GEORGE JONES
george@maximumpc.com

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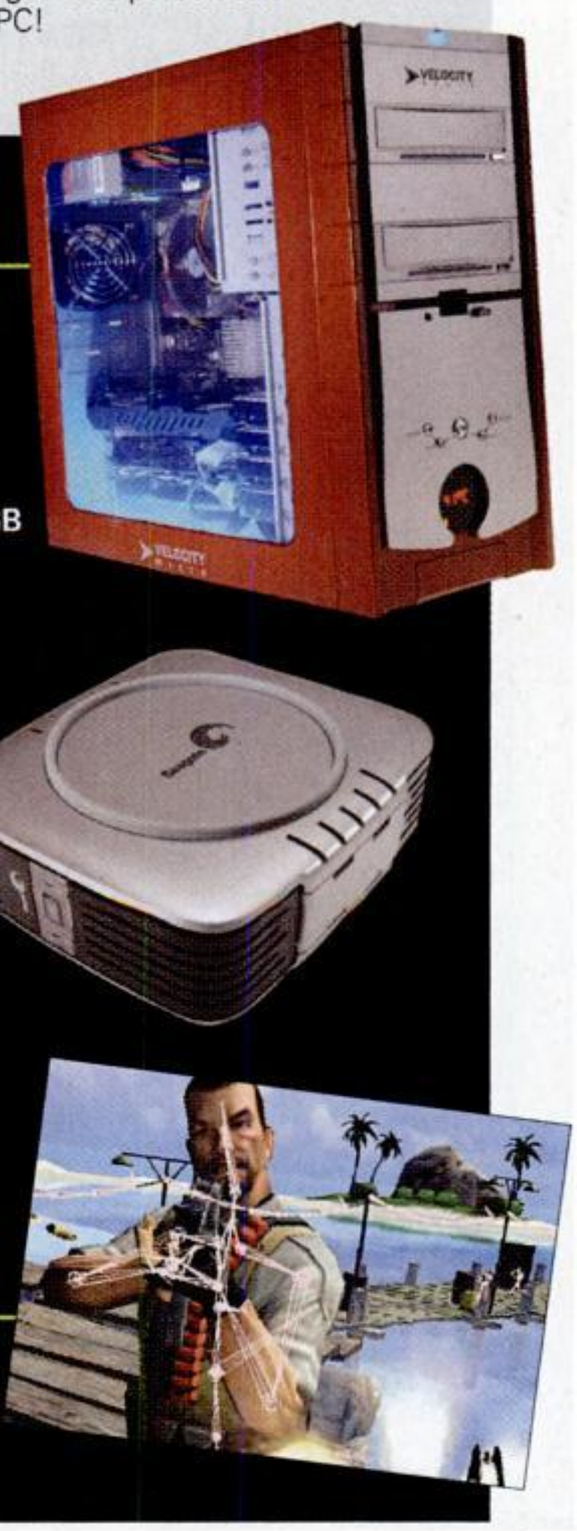

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In/Out

You write, we respond

XP RELOADED = WINDOWS ME?

So now Microsoft is going to provide an interim release for Windows? Apart from the various security and bug fixes that *should* be there, we'll probably see new iterations of core MS technologies, right? So, DirectX 10, *Media Player 10,* maybe even the huge taskbar along the right-hand side of the screen that the folks in Redmond are so hot for. But still, this all seems familiar to me. Haven't we seen this before? Sure we did, and Windows ME was certainly one of the crappiest pieces of software ever distributed on an optical disc. Maybe this time it will be different, but I think Microsoft should learn from its previous mistakes and leave interim releases for the Service Pack team. Besides, if Longhorn really is as good as they claim, there shouldn't be anything to fear from us Linux people anyway, right?

—JONATHON "THE BUBBLE" ANDERSON

VB HATER: TEACH C++!

Hey, I respect what you guys publish. But, teaching people to program with Visual Basic ["How to Learn Visual Basic Programming," May 2004]? Sure, VB apps aren't as bloated as Java apps, but it's close! How about doing your readers a favor and teaching them a real language like C or C++?

—BRIAN CUMMINGS

HOW-TO EDITOR WILL SMITH RESPONDS: As we planned last month's VB programming article, we consulted several programming experts about the "right" programming language to use for our introductory How-To series. We eventually settled on Visual Basic .NET for several reasons: It's an object-oriented language, like C++ and Java, and we felt it was vital to introduce our readers to the concepts of object-oriented programming early. We also like the fact that there is a large community of Visual Basic programmers, which means there are loads of resources on the web, and most everyone knows someone who is at least a shade-tree Visual Basic programmer. Finally, the actual syntax of VB.NET is much easier for beginners to understand than C, C++, or Java, and thus, easier for us to explain without getting buried in the minutiae of syntax.

SHOULDN'T THERE BE GROUND RULES FOR LAPTOP ROUNDUPS?

As an avid reader of your magazine, I patiently waited for the laptop roundup in your April issue. After reading the article I called Alienware and attempted to order the featured configuration. Unfortunately, Alienware told me it would not provide the reviewed configuration for several weeks. While the reviewed configurations of other laptops in your article are available, do you think it is fair, wise, or perhaps even honest to allow manufacturers to have products reviewed on a competitive basis when those products are not available to the public by the published date of your magazine? I understand you wish to give each company the chance to show off its best, but some rules to competition must apply.

SENIOR EDITOR GORDON MAH UNG RESPONDS: While it would be wonderful for every product to be available when the magazine hits the stands, this is not always the case. Many times, vendors are at the mercy of their suppliers, especially when you're talking about bleeding-edge components. In this circumstance, Alienware was late by about two weeks, but has since begun selling the notebook. We learned something else when questioning a spokesperson from Alienware: "The funny thing is that some other companies launch

REGARDING YOUR LEAN MACHINES...

POWER SUPPLY TOMFOOLERY?

In the May 2004 issue you ran an article on three new Lean Machines. I want to know where the hell you found a 350W PSU for only $10? Did you guys fudge some numbers, thinking that we wouldn't notice this discrepancy? I have searched NewEgg, TheNerds, and CompUSA to no avail! Am I completely insane?

—KRISTIAN HERMANSEN

LEAN MACHINE EDITOR JOSH NOREM RESPONDS: Kristian, do you really think we'd try to pull the soft, furry wool of a lamb over your head? Of course there are $10 350W PSUs available! With a quick search on Pricewatch (www.pricewatch.com) we found several. Now, don't take this as an endorsement of $10 power supplies, as the power supply is one of the most important components in your PC. We would have preferred to not use a $10 power supply, but our $500 budget forced us to make compromises, and the power supply got short shrift in favor of more powerful internal components.

RADEON REBUTTAL

In the Lean Machine story in your May issue of *Maximum PC* you claimed to have purchased a Radeon 9800 128MB for $140. Where on this planet did you get that card for that price?! If you go to Pricewatch, the vendors tend to be selling that videocard for around $180. On the other hand, the 9800SE model is sold for around $130. Did you really purchase a 9800SE, or just price a 9800 that you had in the shop as being valued at $140?

—JAMIE HELMAN

EDITOR JOSH NOREM RESPONDS: Sure enough, Jamie, we seem to have published a price that's about $20 lower than what is on the market as of this writing. As an aside, whenever we write articles that involve prices found "on the street," we try to be as accurate as possible. Typically we look at a variety of online vendors' sites and figure out the "average" price for an item. On this occasion, however, we were a bit too optimistic, apparently.

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* RADEON X800 PRO 256MB DDR compared with Nvidia's eVGA FX5950 256MB DDR, as measured by Aquamark3, Halo - Combat Evolved, Splinter Cell, Tomb Raider - Angel of Darkness, Unreal Tournament 2003 and Unreal Tournament 2004. Testing conducted March 30, 2004 on the following system: Pentium 4-3.2GHz CPU, 1GB PC3200 RAM, i875 chipset. 1600x1200 resolution.

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COMING NEXT MONTH

IN THE CAN-YOU-HEAR-ME-NOW? JULY ISSUE OF MAXIMUM PC

ULTIMATE PC MAKEOVERS

In the most essential upgrading story of the year, our Lab experts take three real-world PCs and make them better, faster, stronger—and more attractive. If you're thinking about upgrading your PC—and who isn't?—you cannot afford to miss this feature!

VOICE OVER IP SHOOTOUT

Want to lower your long distance phone bill? In anticipation of mid-summer dialing, we're field-testing a slew of VoIP products and services for this special report. What we've found so far is surprising—we'll show you how you can make your calls for a lot less money.

SPOTLIGHT: BTX

Late this year, a new PC case enclosure and motherboard spec will be introduced. The new spec is called BTX, and it introduces some significant architectural changes. Our special report will get you up to speed on why BTX is being released, as well as how it will change case and mobo design in the future.

PLUS

A CRT shootout, how to wire your PC cables the *Maximum PC* way, and more exclusive details on Alienware's extreme 3D performance enhancer!

product on their web sites without having stock. At the point of sale, they tell customers, 'Oops, we ran out of stock—sorry.' We do not like to do that; we prefer to simply take it off the web when we run out of stock. Why hold up people's money like that?"

HOW COULD YOU OMIT BATTLEFIELD VIETNAM?

I loved your Top 10 Games of 2004 sidebar ("Game On," May 2004), but how could you leave *Battlefield Vietnam* off the list? I've seen post after post about *BFV* bringing PCs to their knees, but hardly anything about *Unreal Tournament 2004*. I believe B*attlefield Vietnam* should have trumped it.

—BRIAN MACK

EDITOR IN CHIEF GEORGE JONES RESPONDS: Omitting *Battlefield Vietnam* was a tough call, but upon further review—specifically editor Will Smith's review that appears on page 95 of this issue—we're glad we left it out. Realistic-looking grass is nice and all, but what good is it if you can't actually hide in it?

BEST OF THE BEST CRT IS OUTDATED

As Sony continues to phase out its line of CRT monitors, the F520 has been discontinued. Therefore it's time to find a new best CRT monitor. Please tell me what to buy!

—DIMITRI KATSAROS

EDITOR IN CHIEF GEORGE JONES RESPONDS: You are correct, Dimitri; the F520 CRT, which has resided on our Best of the Best list for a few years, has been discontinued by Sony (but if you look hard enough, you'll probably still be able to find it). In its place, Sony has released a new model CRT—the GDMC-520K. Next month, our display expert, Katherine Stevenson, will review the GDMC-520K along with three other high-end CRTs to find out which is worth your hard-earned cash.

NOT 70% RUBBING ALCOHOL!

You frequently recommend rubbing alcohol to clean a CPU and heatsink, but this should never be used, as most rubbing alcohol includes some oil to avoid skin abrasion. You should only use pure isopropyl alcohol, obtainable at drug stores, electronic parts stores and opticians.

—TREVOR TIREBUCK

SENIOR EDITOR GORDON MAH UNG RESPONDS: You're right, although we can't recall recommending "rubbing alcohol." We use nothing but 99 percent isopropyl alcohol to clean CPUs and heatsinks around here. Thunderbird or Pabst Blue Ribbon is not recommended.

> **"WE USE NOTHING BUT 99 PERCENT ISOPROPYL ALCOHOL TO CLEAN CPUS... THUNDERBIRD OR PABST BLUE RIBBON IS NOT RECOMMENDED."**

STUDENT FILE SHARERS CAN AND WILL BE TRACKED DOWN

In the April edition of In/Out, letter writer Rick W. questioned whether his rights were violated when his university IT staff confronted him about his open *Kazaa* connection. He asked whether the IT department had the right to investigate his PC and whether his own rights (assuming the right to privacy) were violated. He went on to claim that the IT department "had no way of knowing" what he was doing, or to speculate legal conclusions.

Contrary to his over-confident assertion, the university *did* know what was going on. A good network administrator worth his or her paycheck can monitor network traffic, and if the traffic on port 1214 (the TCP/IP port commonly used by P2P applications) is abnormally high, the admin can track down where the excess traffic is coming from (especially in a switched network). Otherwise, how did the IT staff locate him so quickly? Even if the app doesn't use the default ports, the degree of traffic coming from any particular location is a dead giveaway.

To determine whether anyone's rights were violated, Rick needs to first consult his university's acceptable-use policies before shouting "persecution" or "invasion of privacy!" He would have likely received documents spelling out those policies at the beginning of his school career at that university. Furthermore, some educational institutions require a student's signature, indicating acceptance of those policies prior to being allowed to use that institution's resources.

—JEROME OHNUI

CUT, COPY, PASTE

➤May's review of the Silverstone Nimiz (page 80) mistakenly described the case's front intake fan as "80mm." In fact, the fan is 120mm.

LETTERS POLICY: ***MAXIMUM PC*** invites your thoughts and comments. Send them to **input@maximumpc.com**. Please include your full name, town, and telephone number, and limit your letter to 300 words. Letters may be edited for space and clarity. Due to the vast amount of e-mail we receive, we cannot personally respond to each letter.

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PC CD-ROM SOFTWARE

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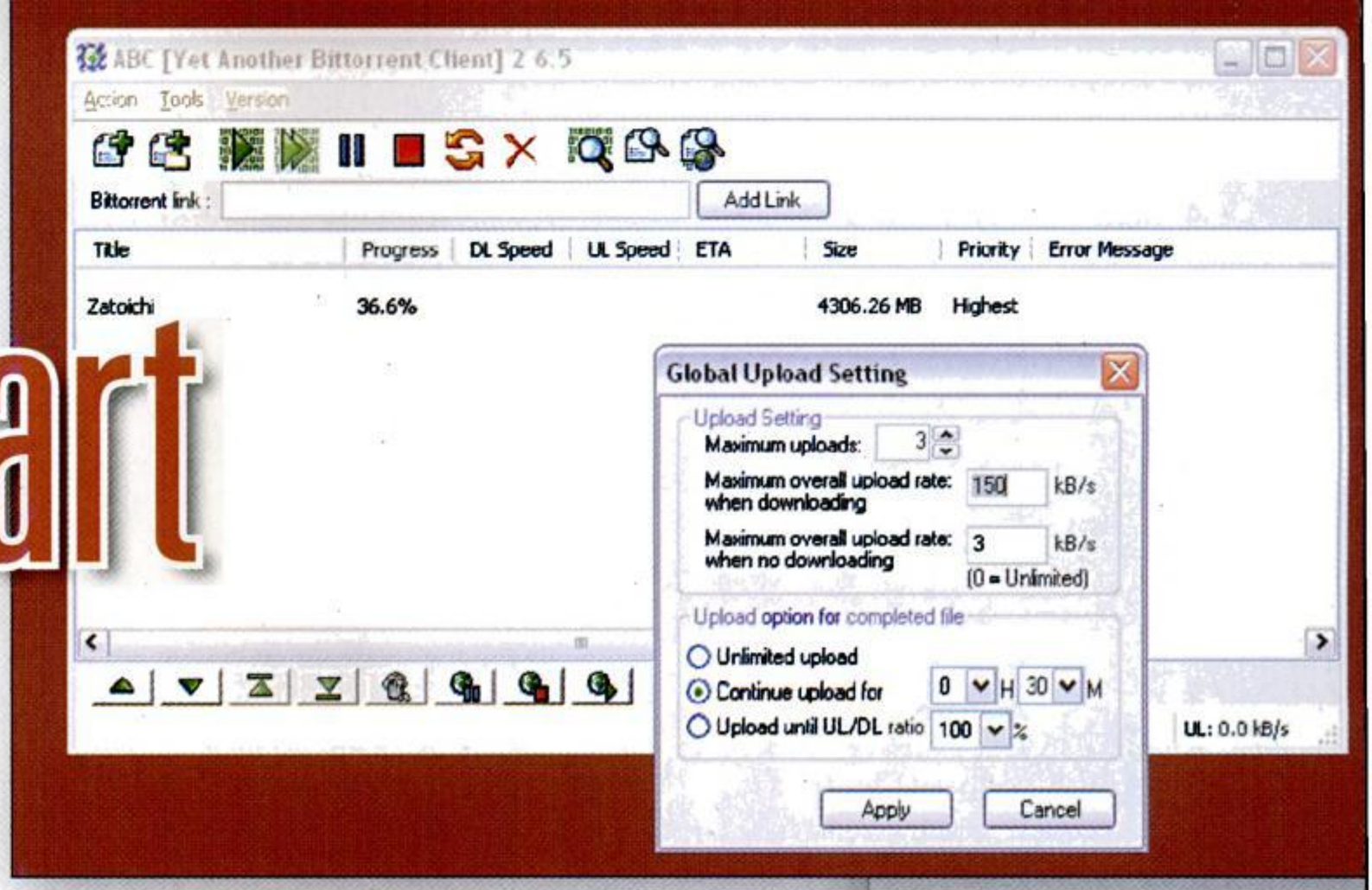
Quick Start

The beginning of the magazine, where articles are small



Got huge files to distribute, but little money for bandwidth? No problem.

Broadcatching: the Savior of Independent Entertainment!

In the near future, two popular Internet technologies will work together to beat big media companies at their own game. Here's how the revolution will transpire

Broadcatching" may sound like slang for picking up girls at the local bar, but the term is intended as a play on the word *broadcasting*, the familiar method of beaming television and radio programming to eager audiences. Of course, only major networks and their affiliates have the equipment, resources, and FCC approval to do so, leaving independent filmmakers and content producers groveling for air time from risk-averse media conglomerates.

But independent filmmakers, musicians, and developers are beginning to see the potential in using two Internet applications—BitTorrent file sharing and RSS syndication—to shatter one of the last barriers to distributing content over the Internet: bandwidth costs. Let's take a look at how the two technologies work, how they integrate together, and the future implications of this serendipitous union.

FIRST, TAKE BITTORRENT...

BitTorrent is an evolutionary take on the P2P file sharing principle. While current file sharing technologies require each user to have a complete copy of a given file before they can share it with others, BitTorrent breaks the file down into small portions called "shards" and allows a user to share whatever part they have already downloaded, even if their own download is still in progress. This technology excels at delivering large files that are in demand; the more people who initialize a download of a given file, the more shards that become available to everyone else, resulting in faster downloads for everyone. As an example of BitTorrent's usefulness, when Blizzard released the beta of its massively multiplayer game *World of Warcraft*, the company used BitTorrent to manage distribution.

An inherent limitation of the BitTorrent technology, however, is that users have to find a "torrent link," essentially a file locator, for each file they want to download, which can be a tedious and frustrating process.

NOW ADD RSS...

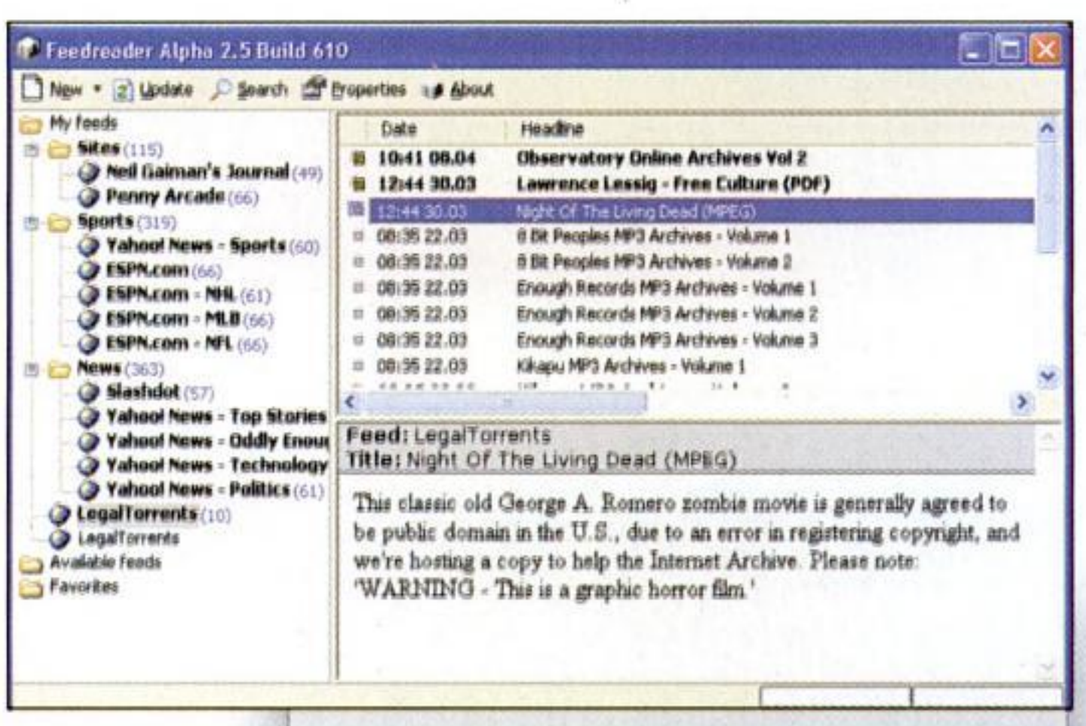
RSS is a simple technology that can alert users when updates are made to their favorite web sites. Users install an RSS "aggregator" and subscribe to a web site's RSS feed. The aggregator then checks the feed at preset intervals and alerts the user when new content is made available. This technology has proven especially popular with web logs, but many other entities, such as news providers, have embraced it as well.

AND VOILA—BROADCATCHING LIBERATES MEDIA!

RSS eliminates the problem of locating torrent links by allowing torrent providers (known as trackers) to broadcast links to torrents via an RSS feed. Theoretically, a user could subscribe to the feed and get alerted the moment a torrent becomes available, "catching" the link as it is "broadcast." Further integration would allow the RSS aggregator to automatically begin the BitTorrent download for you.

The magic of BitTorrent is that it spreads the bandwidth load to every user who downloads the file, making it an attractive and inexpensive alternative to traditional means of file distribution. Imagine subscribing to broadcatches of the Sundance Film Festival showings, or—more significantly—an indie sitcom produced by four guys in a New York loft.

When this catches on, distributing syndicated content will become as viable for Joe-next-door as it is for Fox, NBC, and the Playboy Channel.


Feedreader Alpha 2.5 Build 610
New Update Search Properties About
My feeds
Sites (115)
Neil Gaiman's Journal (49)
Penny Arcade (66)
Sports (319)
Yahoo! News - Sports (60)
ESPN.com (66)
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ESPN.com - MLB (66)
ESPN.com - NFL (66)
News (363)
Slashdot (57)
Yahoo! News - Top Stories
Yahoo! News - Oddly Enou
Yahoo! News - Technology
Yahoo! News - Politics (61)
LegalTorrents (10)
LegalTorrents
Available feeds
Favorites
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10:41 08.04 Observatory Online Archives Vol 2
12:44 30.03 Lawrence Lessig - Free Culture (PDF)
12:44 30.03 Night Of The Living Dead (MPEG)
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08:35 22.03 Enough Records MP3 Archives - Volume 3
08:35 22.03 Kikapu MP3 Archives - Volume 1
Feed: LegalTorrents
Title: Night Of The Living Dead (MPEG)
This classic old George A. Romero zombie movie is generally agreed to be public domain in the U.S., due to an error in registering copyright, and we're hosting a copy to help the Internet Archive. Please note: 'WARNING - This is a graphic horror film.'

Using RSS, you can get information from the web pushed to your desktop.

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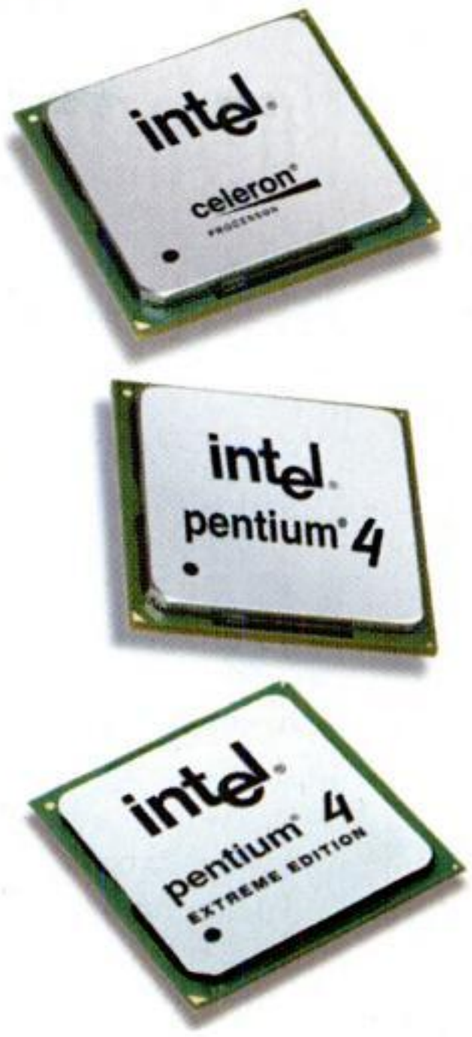
It's Official: Gigahertz is DEAD

Intel ditches clock speeds in favor of a brand-new naming convention

If you've ever found yourself at a store trying to figure out just what the difference is between a 2.8GHz P4, 2.8GHz P4C, 2.8GHz P4E, and 2.8GHz P4A, Intel feels your pain. In response, the company, which is largely responsible for making megahertz the most familiar (if sometimes misleading) representation of CPU power, has decided to de-emphasize clock speeds in favor of feature sets in all its future CPUs.

In the near future, a series of model numbers will replace clock speed as the key component of each CPU's name. For example, a Pentium 4 3.4GHz Prescott core would become a Pentium 4 550. A 3.6GHz version might be labeled P4 560, and the Extreme Edition P4 760.

Confused? Think of the new naming scheme like you would BMW's automobile lineup. The 300 series will represent budget chips, the 500 the midrange, and the 700 designator will represent the top dog. Intel, which received BMW's blessing to use such a similar naming convention, says the model numbers are designed to help consumers understand that clock speed isn't everything, and that cache size, bus speed, and architecture are also important. Although specifics about the various classes have yet to be disclosed, we do know that Intel's naming scheme will debut with the 3.6GHz P4 this summer.



In the very near future, the 3.6GHz Pentium 4 will be renamed the Pentium 4 560.

Intel emphasizes that it won't hide the clock speed of its CPUs in this new system; instead, the company hopes people will look to the model number to guide them to the level of performance they are willing to pay for, and then ask more questions about cache size and bus speed among the CPUs offered in that tier.

Chip analyst Peter Glaskowsky said it won't be easy for Intel to educate consumers, but also believes that Intel has no choice. "Intel's having more than enough trouble explaining why a 1.6GHz Pentium M can get more work done on a battery charge than a 2.8GHz Pentium 4. And it's never been able to get people to understand why a 2.8GHz E processor is faster than a 3GHz A processor," Glaskowsky said.

Does this mean Intel is hitting a wall in the clock speed race? Analyst Rob Enderle doesn't think so. "The effort has nothing to do with them hitting a megahertz wall," he said. Although Enderle believes the new naming scheme will help Intel solve the problem of trying to explain to consumers the difference between a P4EE, P4E, Centrino, and Celeron, he wishes the company had gone a step further and standardized a performance metric instead.

"Frankly, I wish they had sat down with AMD and VIA and come up with a number that's consistent," Enderle said.
"That's what the customer would like."

HAVE YOU BOUGHT A PC FROM L COMPUTERS?

For that matter, has anyone?

We featured L Computers on our January 2004 cover for the company's audacious approach to high-end PC design, even though we were skeptical about some of the hyped technologies that were MIA in our test unit.

Now we're even more skeptical. Despite announcements of even faster computers and retail partnerships "soon," *Maximum PC* has been unable to locate a single person who's purchased a computer from **www.go-l.com.** If you have—or if you've even tried—we'd like to talk to you. E-mail us at **input@maximumpc.com.**

ALT.OPINION.RANTS BY JON PHILLIPS

How To Disarm Ashcroft's Army

Thanks for nothing, Janet Jackson. Your teat-baring stunt during Super Bowl XXXVIII was the culture-war equivalent of the Archduke Ferdinand assassination. Anti-smut absolutists have been skirmishing with the ACLU for years, but in one fell swoop, you gave Ashcroft's Army the opening it's been looking for.

We now have broadcasters cowering in fear of FCC fines. You can't watch reality TV without seeing some warning to the effect of "Program may contain adult material. Parental discretion is advised." And Clear Channel—the monolithic, holier-than-thou media megacorp—has dropped Howard Stern from its stations. But we're really just in the opening stages of a protracted war against First Amendment rights. Post-Janet Jackson, Attorney General John Ashcroft has promised to step up a Justice Department war on indecency, and this includes eliminating Internet porn.

Thus the focal point of this column: If you believe that the Internet should continue to be the preeminent vehicle for unfettered free speech, then you best pay close attention to what the Bush Administration has in store. We're in the midst of an election year, and a "let's clean up the net campaign" would galvanize vast numbers of people who don't like the direction America is heading.

Me? Most porn doesn't offend me. I find the video of the Joe Theisman injury to be more disturbing. I am appalled, however, by the sheer amount of unsolicited hardcore imagery that any man, woman or child might encounter during day-to-day web-surfing. Porn entrepreneurs are relentless in their quest for new customers, and as a result, we all must suffer popup ads and site-redirects for content we never asked for. And, believe it or not, many times I really *do* want a game walk-through rather than screen grabs from *Moulin Splooge*.

When push comes to shove (there's a triple-entendre in their somewhere), the Internet must self-police before anti-libertarians chip away at our rights. As repugnant as hardcore porn might be to some, it's still protected under the law—we just shouldn't expect anyone to accept its uninvited flow onto their desktops. So, in The World Where Phillips Calls The Shots, any web site operator pushing pop-ups and redirects containing porn would be vulnerable to fines and prosecution. Likewise, the front doors of porn sites would be devoid of hardcore imagery, and in order to get to any actual porn within, an adult would have to qualify his age with something more stringent than a "yes" answer on a drop-down menu.

These are reasonable moves the online porn industry should have adopted long ago. It's a simple matter of pushing the first domino away from Ashcroft's grasp before he knocks down the entire line.

Jon Phillips was formerly editor-in-chief of Maximum PC, *and now serves as the magazine's editorial director.*

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▶▶ FAST FORWARD BY TOM R. HALFHILL

Be Thankful for Reverse-Engineering

My recent comparison of the 64-bit x86 architectures from AMD and Intel sparked some press coverage, but I was surprised when reporters focused on my less important conclusion: that Intel reverse-engineered its EM64T architecture from AMD64. (My full 5,000-word analysis, summarized here last month, appeared in the newsletter *Microprocessor Report*.) What I considered my most important conclusion—99 percent software compatibility—earned fewer headlines.

Users in some Internet discussion groups focused on the reverse-engineering angle, too. Some claimed that EM64T wasn't really the product of reverse-engineering because Intel didn't have to uncover any secret technology—AMD64 is well-documented in AMD's freely available technical manuals. Others noted that AMD and Intel have a patent cross-licensing agreement and must have shared technology or must have collaborated on the 64-bit extensions.

In fact, Intel developed EM64T independently by working backward from AMD64, without help from AMD. Indeed, this caused at least one incompatibility. EM64T doesn't support two 64-bit instructions found in AMD64 because Intel's engineers began working with early copies of AMD64 manuals, which listed those instructions as invalid. Later, AMD decided to support the instructions and revised the manuals.

Unfortunately, Intel didn't learn about AMD's switcheroo until seeing a draft of my analysis. Not believing me, the chipmaker even tested some AMD64 processors and verified that those two instructions won't execute in 64-bit mode. But we later learned that current AMD64s don't support the instructions, but future chips will.

There was no collaboration, despite the companies' patent cross-licensing agreement. That license—the outgrowth of a long legal battle between AMD and Intel in the 1990s—merely prevents the companies from filing patent lawsuits against each other.

Intel's effort to duplicate AMD64 fits my definition of reverse-engineering: designing something by starting with someone else's finished design and making it work like the original—without the cooperation of the original designers. Even when a published specification is available, the reverse engineers still have to look for undocumented features and for inconsistencies between the specification and the implementation.

Certainly, the role-reversal of Intel copying AMD's x86 technology is newsworthy. Typically, AMD has reverse-engineered Intel's technology. But, what's ultimately more important is that Intel has created a 64-bit architecture that's almost fully compatible with AMD64.

Tom Halfhill was formerly a senior editor for Byte *magazine and now an analyst for* Microprocessor Report.

Alienware Hints at Powerful, Top-Secret Graphics Weapon

We crossed razor-wire and miles of desert to learn the truth about ALX, and all we got was this damn logo.

We discovered that the company's high-end ALX line of PCs may boost performance by as much as 70 percent!

Was it found among the debris at Roswell? Alienware, the company that likes to shroud its products in hushed conspiratorial tones, recently told us it's preparing to introduce a breakthrough in PC technology that will increase the performance of gaming and graphics-intensive applications by an unheard of 70 percent. The technology will be implemented exclusively in a new line of customized PCs bearing the brand-new, "high-end" Alienware moniker of ALX.

The company said it will show off the technology in Los Angeles this May at the E3 game conference in Los Angeles. Alienware officials are keeping tight wraps on what exactly the technology is, but did promise that the new technology will be a combination of hardware and software, and that the speed increase will not come at the expense of visual quality.

While it's unusual for PC makers to dabble in proprietary graphics hardware, Alienware has a history of tinkering with its wares to give gamers an edge. In the late 1990s, the company dabbled with technology from Metabyte called Parallel Graphics Configuration (PGC) that combined two graphic cards together in a Voodoo2-style Scan Line Interleave mode. Alienware officials told us the company's latest technology is not PGC, but the details remain classified. We'll bring you more details next month.

FUN-SIZE NEWS

iPOD MINI=FLAWED?

iPodlounge (**www.ipodlounge.com**) is reporting that some iPod Mini owners are experiencing audio distortion after 30 to 45 days of use, which one user attributes to a "weak connection between the headphone port and the main circuit board." We didn't experience this problem in our own tests (see the review on page 91), but we're pleased that Apple is being uncharacteristically undefensive about the issue, saying that it's looking into the reports and reminding users that the product carries a one-year warranty—if you can find a replacement for the notoriously out-of-stock item, that is.

MICROSOFT XNA: EASIER GAME DEVOLOPMENT

Facing brutal competition from console systems (including its own Xbox), Microsoft has unveiled an initiative called XNA that aims to make it easier than ever to develop games for Windows. XNA is comprised of three components: middleware that makes it easier to generate the massive amount of art required by today's games; new specs to standardize PC gamepad button and stick placement; and an Xbox Live-like matchmaking service for Windows games.

GOOGLE'S GMAIL

Because it was announced on the eve of April Fool's Day, we initially questioned its validity, but Google's "Gmail" service, which includes one free gigabyte of storage, is no joke. According to Google, message exchanges will be threaded in what appears to be a newsgroup-style format and won't contain any banner ads. Privacy watchdogs are on high alert however, as the content of incoming messages will be scanned and "relevant text ads" will be appended to them. There's no set date for a public launch at press time, but check for updates at **http://gmail.google.com**.

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Hard Drive Hysteria!

We preview two new, innovative hard drives

Maybe you *can* be too rich, as Tyco executives Dennis Kozlowski and Mark Swartz might be thinking at the moment, but it remains true that your hard drive can never be too big or too fast. These two breakthrough drives from LaCie and Seagate ought to satisfy your craving for more, without landing you in the pokey for being too greedy.

LaCie Bigger Disk

Admit it—when you first heard of 250GB hard drives, you engaged in a vivid fantasy involving you, four drives, and a single, Internet-devouring terabyte array. Now you can indulge yourself with LaCie's Bigger Disk, the first desktop storage device ever to hold a whopping terabyte of data.

Inside the Bigger Disk spin four 250GB 7,200rpm drives (LaCie wouldn't say who makes them, but we do know they contain 8MB buffers) spanned into a one terabyte volume via an onboard Oxford 922 chipset. Each drive is written to sequentially as it gets filled, but to the user, it functions as one giant volume. The drive's enclosure is made of aluminum to dissipate heat and is stackable as well—in case a terabyte just doesn't cut it. Expected to ship in May, the Bigger Disk includes FireWire 800/400 and USB 2.0 interfaces for maximum cross-platform compatibility and costs just a mere, ahem, $1,200.

Boasting a whopping one terabyte of storage, LaCie's Bigger Disk makes 400GB drives seem puny.

Seagate Savio

Recently released, the Seagate Savio is the first 10,000rpm *2.5-inch* drive. This tiny speedster sports an 8MB buffer, capacities of 36GB and 73GB, and a claimed seek time of 4.1ms. Though they're strictly SCSI for now, we believe the technology in these supa-fast drives will eventually trickle down to desktops and laptops in the hopefully not-too-distant future.

Seagate's new 2.5-inch Savio drives are 70 percent smaller than a standard 3.5-inch drive, yet offer big drive performance.

WHAT COMES AFTER "TERABYTE?"

Ever wonder how much your hard drive will hold in 2010? Given the fast-moving evolution of hard drive sizes, it's inevitable we'll eventually move past the gigabyte and into the realm of the terabyte. But what comes after that? Here's a short breakdown—impress your friends!

➤ TERABYTE	1,000 gigabytes, or about 200,000 5MB MP3 files.
➤ PETABYTE	1,000 terabytes, or about 200,000,000 MP3s (take that, RIAA!).
➤ EXABYTE	It's tough to comprehend this much space, but it's a 100,000 terabytes. That's *200 billion* MP3s.
➤ ZETTABYTE	Still with us? A zettabyte is 1,000 exabytes, which translates to roughly 200 trillion MP3s
➤ YOTTABYTE	Yes, seriously. One thousand zettabytes equals a yottabyte, which is 200 quadrillion MP3s.
➤ HELLABYTE	One kajillion yottabytes. OK, we just made this one up.

GAME THEORY BY THOMAS L. McDONALD

The 34-22-34 of Gaming

Real-time per-pixel lighting, volumetric fog and glow effects, animated textures, bump-mapping, and a 1 kilometer draw-distance—these terms are the 34-22-34 for the über-game geek. Hey, baby, is that a mip-map in your pocket or are you just glad to see me?

In a perverse cycle, we gamers build state-of-the-art PCs, and then vigorously search for games that can bring those rigs to their knees, forcing us to upgrade even further. We're deeply afraid that our new graphics card has a feature that is going untapped, or a few computing cycles that are not being utilized. A psychologist would probably dub this a "cycle of dependency," and recommend therapy, not realizing that $350 (the cost of a good card and a copy of *Far Cry*) can buy dozens of hours of good, wholesome, therapeutic mayhem and visual splendor. Measured against a $150 per hour therapy rate, that's a damn good return on your dollar.

***Far Cry* is, in fact, the game that separates the Big Tough Man Rigs from the Puny Little Boy Rigs. "Can you run *Far Cry* at very high detail and at 1280x1024x32 resolution?" is the gamer equivalent of "What do you bench?" As a measure of computer manliness, it's a fair one, since *Far Cry* happens to be the best first-person shooter in years.**

I haven't witnessed a break-out moment in an FPS equal to my first sight of *Far Cry*'s sun-drenched tropical island vistas and crystal-clear water since that moment in the first *Unreal* when I emerged into a clearing and saw the landscape, with scores of birds flitting through the air. Crytek has the bold cockiness of a developer who knows exactly what its engine can do, and is determined to prove it in the most dramatic fashion possible. The bright light, dense foliage, brilliant translucent surfaces, complex models, detailed textures, and vast draw distance combine to create the most impressive technology debut in memory.

If the gameplay faded from that point on, the debut of the Cryengine would still be remembered for a long time. Fortunately, Crytek has learned from its predecessors, cherry-picking the best elements of *Half-Life*, *Soldier of Fortune*, and a host of other FPS titles and combining them into a tight, engaging, riff on *The Island of Dr. Moreau*. What it lacks in originality, it more than makes up for in sheer craft.

And now that we've seen the first truly next-gen graphics engine, what can we expect next? Can *Half-Life 2* and *Doom 3* deliver something that will make *Far Cry* a mere stopover on the way to the future of FPS graphics? Whatever the answer, 2004 is already shaping up to be a watershed year for 3D graphics, making us all very lucky gamers.

Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.

TechnoFile

Quick takes on technology trends

Zalman Takes Water-Cooling to New Heights with the Resorator!

This is no mock-up. This is no *Photoshop* job. This is no prototype.

This is the Resorator 1, the most innovative answer to blistering-hot CPUs and videocards we've seen to date.

Designed by Zalman, a company known for exotic-looking cooling technologies, the Resorator (the name is a hybrid of *reservoir* and *radiator*) stands nearly two feet high and six inches in diameter. Similar to conventional water cooling, it circulates water through water blocks you attach to your system's CPU, GPU, and even your hard drive. These blocks wick heat away and transfer it to the water, which gets pumped into and through the anodized aluminum column.

Here's where the Resorator's advantage becomes clear. Because the unit is surrounded by heat-spreading fins and sits outside of the PC case enclosure, it's able to transfer accumulated heat to the air much more effectively than a normal water-cooling rig. After dispersing the heat, the water is pumped back into your PC for another circulatory trip.

The Resorator comes bundled with Zalman's ZM-WB2 gold-plated copper base water block, but you'll have to pay extra for water blocks for your videocard and hard drives.

$280, www.zalmanusa.com

Waterblocks, like the CPU attachment pictured here, allow the Resorator to absorb the heat from components and transfer it to the external radiator.

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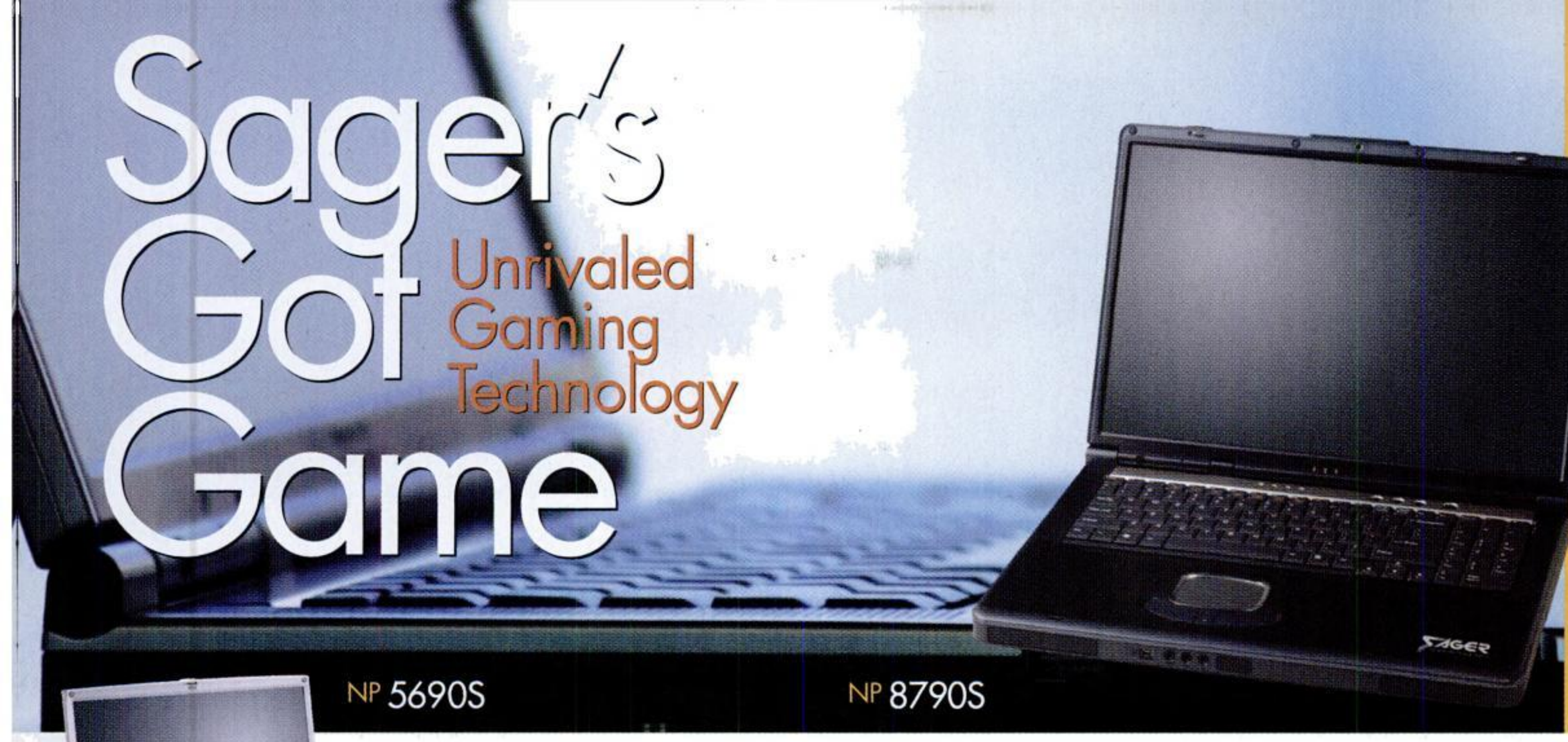
Sager's Got Game

Unrivaled Gaming Technology



NP 5690S

NP 8790S

Take your game to the next level!

Go beyond the limits of the conventional office. Sager notebooks provide not only the best business performance, but also the best gaming performance available. Loaded with the latest components, access today's business and gaming software with ease. Sager's power, speed and graphics surpass all others.

NP5690 FEATURES

- Intel® Pentium® 4 Processor with Hyper-Threading Technology and Max 2048MB PC3200 (400MHz) Dual Channel DDR system memory give you the better performance than you've ever dreamed of.
- Powerful ATI MOBILITY™ RADEON™ 9700 with 128MB DDR Memory brings your pictures to life on the high-contrast LCD screen.
- Dual Smart Bays (one fixed/one versatile) allow this system to be customized just the way you want it. An optional second battery extends the run time, secondary HDD for extra storage capacity, 6-in-1 Card Reader for your digital media or an additional CD-ROM device installed for backup.
- The front panel Audio DJ CD player control with separate power switch lets you play your favorite music CD while on-the-go or relaxing in the office.
- Using optical SPDIF output (5.1CH for DVD movies) combined with the TV-out port allows you to watch DVDs on long trips or hook right into your home theater system.

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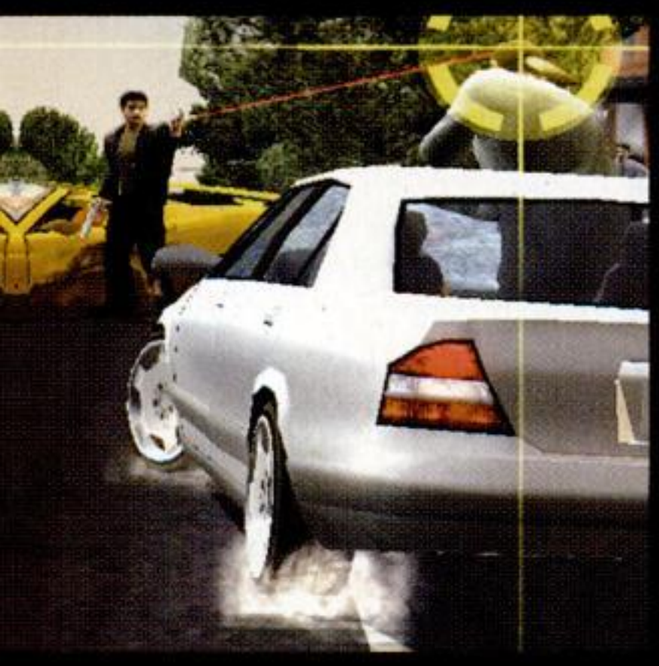

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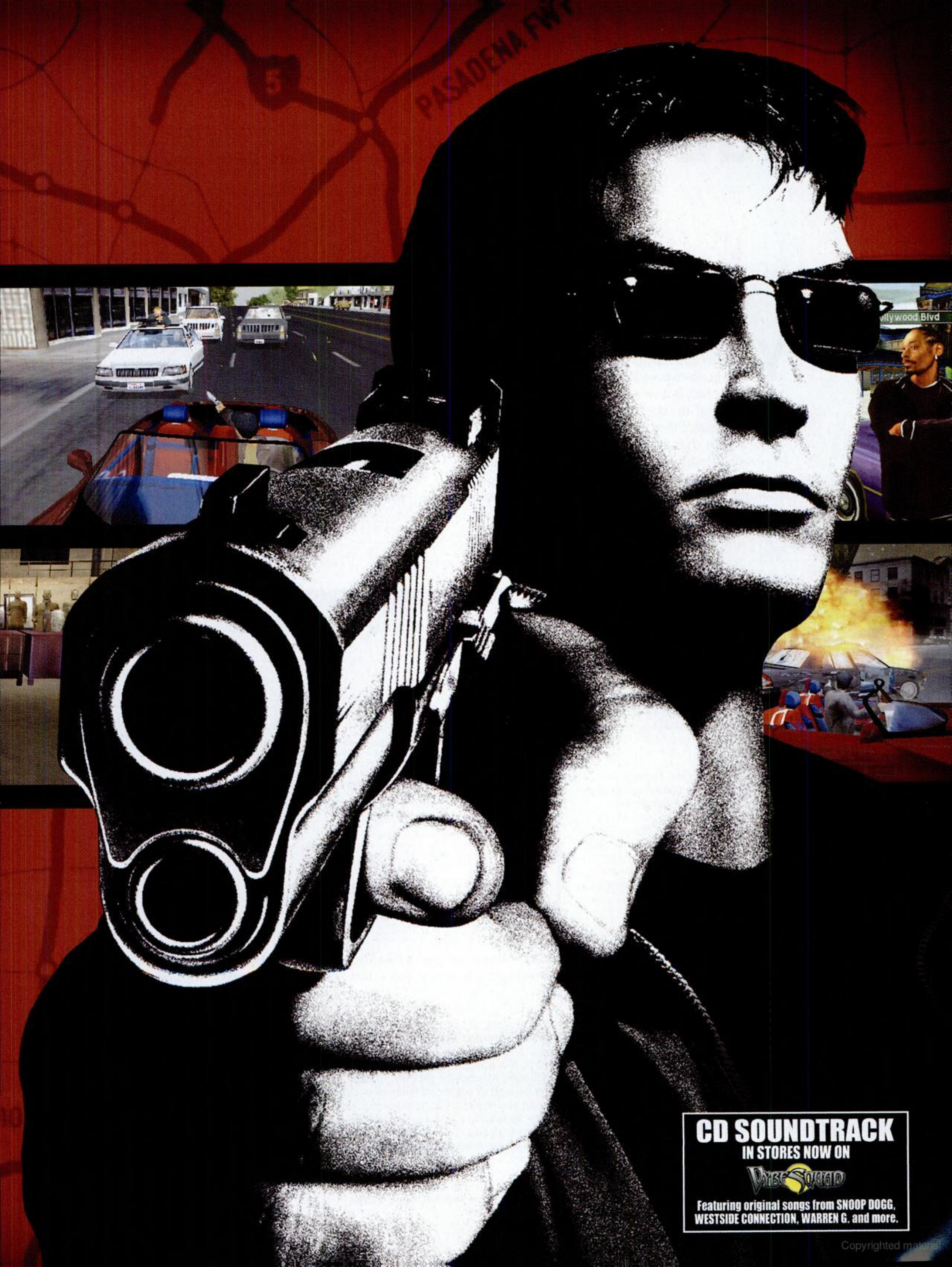

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Head2Head

A showdown among natural PC competitors

THIS MONTH: Office Suites!

You could be running a crusty 486 or a smoking 3GHz Pentium. You may prefer *Internet Explorer* over *Mozilla, Nero* over *Easy CD Creator,* or *PaintShopPro* over *Photoshop*. But when it comes to so-called "productivity software," the odds are overwhelming that you're using Microsoft *Office*.

But things change, especially when dollars are involved. IT folks cringe at the rising cost of the Microsoft *Office* suite, and many users feel ripped off when they drop a huge wad of cash for applications stuffed to the gills with features they'll never use and might not even want. As a result, more users are beginning to utter the phrase that puts Bill Gates' panties in a twist every time he hears it—"open source software."

Now that the shrink wrap has come off the new iterations of *Office* and *OpenOffice.org,* we think it's time to see how each suite measures up against the other. Is *Office* really worth the price of some low-end PCs? Will you download the free *OpenOffice.org* suite only to find you got what you paid for? Let's have a look.

—OMEED CHANDRA

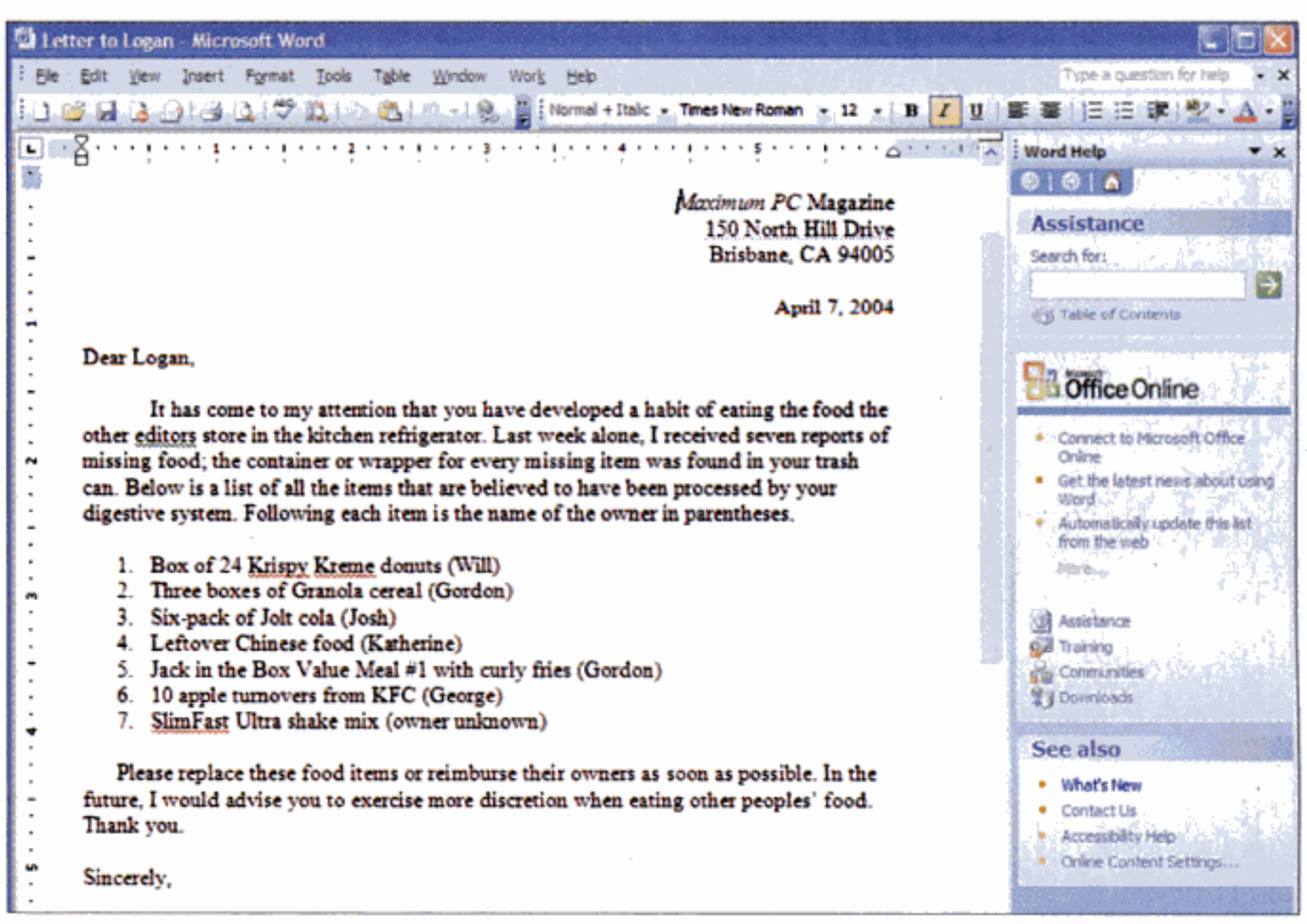
MICROSOFT OFFICE PROFESSIONAL EDITION 2003

Features: *Office's* adaptive formatting and Smart Tags are evolving from aggressive annoyances into helpful, advanced features that detect what you're doing and offer to perform handy tasks like create bulleted lists, or look up driving directions when you type an address in a *Word* document. Additionally, a host of slick new features have made their debut, including support for handwritten input on Tablet PC devices, advanced collaboration and sharing capabilities, and one-click access to online reference sources. In terms of features, *Office* is the steel body-shop toolbox to *OpenOffice.org's* lunch pail.
Winner: Microsoft Office

Applications: The latest version of *Office Professional Edition* drops the *FrontPage* web development application from the mix, but adds Microsoft's *Publisher* desktop publishing program (which, along with *Word,* is capable of outputting documents in HTML format). *Office* also includes an e-mail and scheduling program (*Outlook*) and Microsoft's powerful *Access* database. *OpenOffice.org's* inclusion of a basic HTML editor and drawing app isn't enough to compensate for its lack of desktop publishing, e-mail, and database tools, so Microsoft takes this category in a landslide. **Winner: Microsoft Office**

Value: While Microsoft does offer a low-cost, stripped-down version of *Office* via its Student & Teacher Edition, which includes four essential apps—*Word, Excel, Outlook,* and *PowerPoint*—it's still pricey at $150. Corporate users will love *Office's* full suite of apps and network-enabled collaboration, but most folks will have a hard time justifying the $500 expenditure—especially when *OpenOffice.org* is for free.
Winner: OpenOffice.org (duh)

Compatibility: The file formats used by the programs in *Office* have changed slightly over the years, leading to some minor but shameful compatibility issues when reading files created in older versions of the software. However, we didn't experience any significant problems in testing. All in all, *Office* was more compatible with other file formats than *OpenOffice.org*—and the new 2003 edition can read and write in XML too!
Winner: Microsoft Office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April 7, 2004
Dear Logan,
It has come to my attention that you have developed a habit of eating the food the other editors store in the kitchen refrigerator. Last week alone, I received seven reports of missing food; the container or wrapper for every missing item was found in your trash can. Below is a list of all the items that are believed to have been processed by your digestive system. Following each item is the name of the owner in parentheses.
1. Box of 24 Krispy Kreme donuts (Will)
2. Three boxes of Granola cereal (Gordon)
3. Six-pack of Jolt cola (Josh)
4. Leftover Chinese food (Katherine)
5. Jack in the Box Value Meal #1 with curly fries (Gordon)
6. 10 apple turnovers from KFC (George)
7. SlimFast Ultra shake mix (owner unknown)
Please replace these food items or reimburse their owners as soon as possible. In the future, I would advise you to exercise more discretion when eating other peoples' food. Thank you.
Sincerely,

***Word's* ubiquity—much like the rest of the *Office suite*—is an undeniable convenience in many ways, but is it worth the premium price? We think it is.**

Ease-of-use and interface: The 2003 edition of *Office* sports a somewhat revised interface that looks good and is reasonably functional. However, it's easy to get overwhelmed by the barrage of advanced features in *Office* when you're just trying to crank out a quick letter to Grandma. In case you get lost, you can fall back on the top-notch help system, which automatically connects to the Internet to update and expand its contents. Applications launch fairly quickly, which lowers our blood-pressure levels considerably.
Winner: Microsoft Office, but it's close

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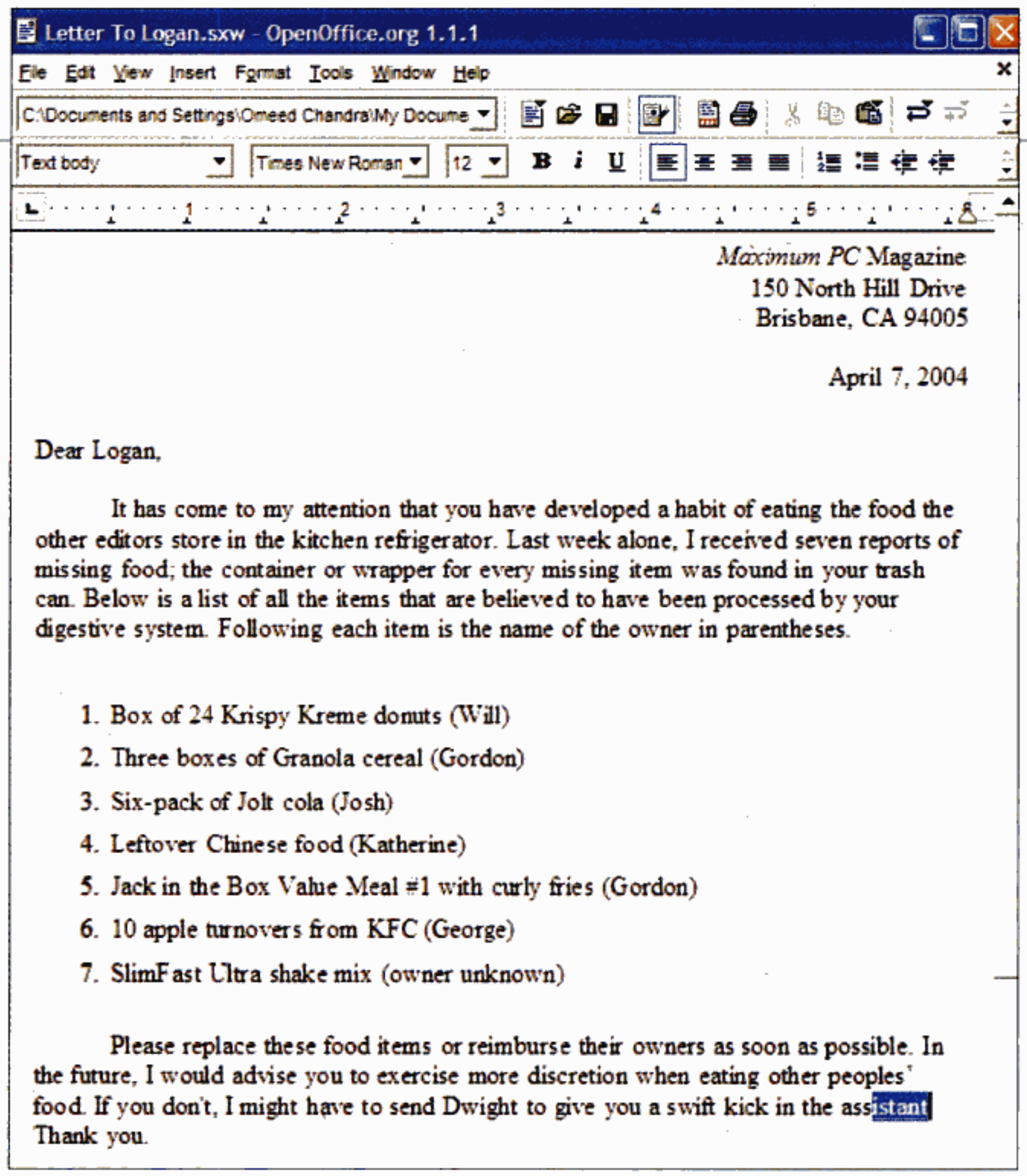
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6. 10 apple turnovers from KFC (George)
7. SlimFast Ultra shake mix (owner unknown)
Please replace these food items or reimburse their owners as soon as possible. In the future, I would advise you to exercise more discretion when eating other peoples' food. If you don't, I might have to send Dwight to give you a swift kick in the assistant. Thank you.

Features: *OpenOffice.org* includes many of the same adaptive formatting features as *Office*, and even tries to one-up Microsoft with word-completion technology that guesses what word you're typing and fills in the rest. But just about the only thing we like about this "feature" is that it can be disabled. *OpenOffice.org* also lacks many of *Office's* coolest features, like Smart Tags and language translation, and comes with far fewer document templates and wizards. *OpenOffice.org* does have a few tricks up its sleeve, though, including the ability to export documents to PDF or Flash formats with a click of the mouse—that's nice. **Winner: Microsoft Office**

Applications: Aside from its three core applications—a word processor, presentation program, and spreadsheet—*OpenOffice.org* also includes rudimentary drawing and web page creation apps. Predictably, however, *OpenOffice.org* can't hold a candle to *Office Professional Edition,* which comes with a desktop publishing program, a database, and an e-mail and scheduling program. Yes, we know there are plenty of free e-mail programs out there, but none can rival Microsoft *Outlook's* powerful features, like its integrated scheduler and comprehensive spam filter—and even if you already had an e-mail app, *OpenOffice.org* would still be missing the database and desktop publishing capabilities. **Winner: Microsoft Office, by a mile**

Value: This one's an open-and-shut case. *Microsoft Office Professional Edition 2003* costs $500. *OpenOffice.org* costs $0. You do the math. **Winner: OpenOffice.org**

Compatibility: We applaud Sun's choice of industry-standard XML as the file format for *OpenOffice.org* documents. As for compatibility with other popular file formats, *OpenOffice.org* opened most of the files we threw at it without a hitch, but a few *Word* and *PowerPoint* documents containing special formatting were displayed incorrectly. *Microsoft Office* isn't perfect either, but its compatibility issues are fewer and farther between than those of *OpenOffice.org*. Plus, so many people have *Office* that compatibility can be assumed. **Winner: Microsoft Office**

One of the biggest sources of hesitation about moving to a different productivity suite is the terrifying thought of having to adapt to a new interface. But as you can see, there's little to be afraid of with OpenOffice.org's familiar layout.

Ease-of-use and interface: If you're used to *Microsoft Office*, it won't be hard to make the transition to *OpenOffice.org*. Many (though not all) of the menus and shortcut keys are similar to those of *Office*, and the interface is fairly straightforward. However, some seemingly simple tasks, like moving toolbars around, are less intuitive in *OpenOffice.org* than in *Office*. The help system is adequate, but lacks the ability to automatically connect to the Internet for updated help files. And why the hell does each app take three times as long to start as its counterpart in *Microsoft Office*? **Winner: Microsoft Office, but it's close**

MAXIMUM PC VERDICT 7

+ JERRY RICE

For basic productivity duties it does a good job. And it's free.

– BURNT RICE

Slow, and not as feature-rich or easy to use as Microsoft *Office*.

Free, www.openoffice.org

THE UPSHOT

As much as we like to root for the underdog, we have to call 'em like we see 'em, and *Office Professional Edition* is clearly the better product in this match. It's fast, easy to use, and replete with useful features. *Office* is also your best bet if file compatibility is a major concern. That said, for the average home user, *Office* is overkill, and its exorbitant price tag puts it out of the running for a Kick Ass award.

If you can get by with just the basics, like creating spreadsheets, typing papers and letters, and building multimedia presentations, then *OpenOffice.org* is a capable alternative at a killer price. Over time, we expect to see this free software suite improve in quality and performance, so Microsoft had better enjoy this advantage while it has it. ■

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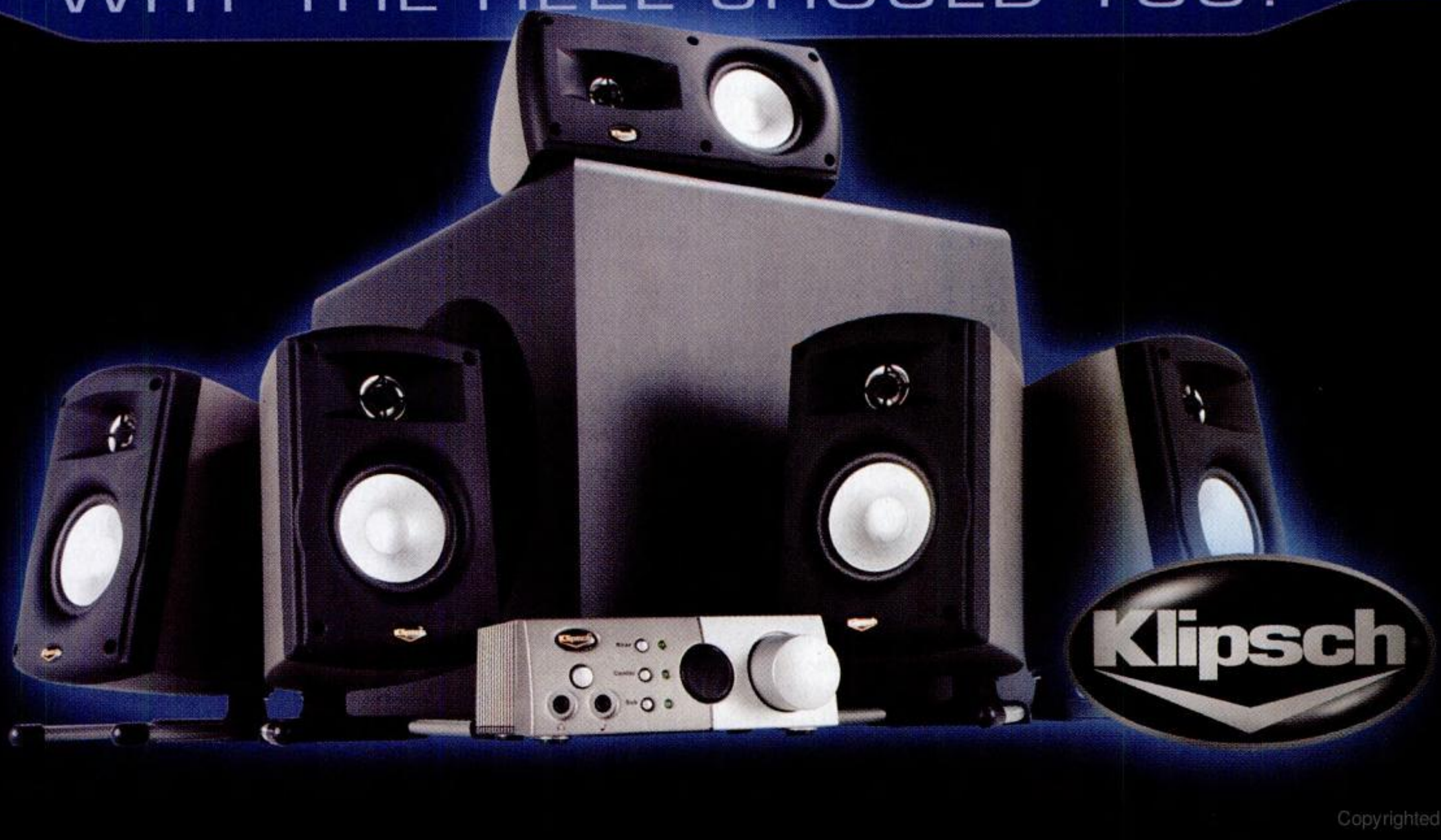

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WatchDog

Say hello to Cleo, WatchDog of the Month.

Maximum PC takes a bite out of bad gear

THIS MONTH: The WatchDog goes after...

>Game Pirates >TDV >Lik Sang

Pirates Screw Everybody

This month, the Dog sifted through the pile of mail and noticed a distinct pattern of chatter: The latest round of anti-piracy software is totally whacked, to use the parlance of our times.

DEAR DOG: I know you deal more with hardware, but I figure a hardcore dog like yourself might also frag like the rest of us. I bought *Unreal Tournament 2004* after playing the sweet, sweet demo. After installing all six discs, though, I received the following error message: "Insert the original disc instead of a backup. See **www.securom.com/copy** for more details." That web address at SecurROM.com tells you nothing more than: "You are trying to start a copy-protected application which requires the original disc to be in the CD/DVD-ROM drive. Please check to make sure your disc is an original."

Boy, did my jaw drop! I spent the next few days trying to get it to work with very limited success. Atari has yet to answer my e-mail and the community is pretty mad too!

I don't know where we'll be come LAN-party time if we can't use *UT2004*. We might have to revert to playing, ugh, *Counter Strike*. Help!

—Aaron H.

THE DOG REPLIES: If you see a pattern, raise your paw. It appears that game publishers' latest anti-piracy software takes issue with the virtual drive software that lets people copy an application to their local hard drive and run it as though it were still on the CD or DVD. This may not be by mistake, either. While virtual drive apps are mostly used for legitimate purposes, such as on a mini-laptop or Tablet PC that lacks an optical drive, it's also become a recognized tool of game pirates. In some cases, the conflict results from legitimate commercial software such as *Norton Ghost*, *Nero*, and *WinImage* because they install a virtual drive to work. And the problem isn't confined to *Far Cry* and *Unreal Tournament 2004* either. We've heard similar reports of problems with other new games, such as *Painkiller*. Often, disabling the virtual drive software is enough to let the game run, but the Dog has also heard reports that the software must be completely uninstalled for the game to work.

Even worse, sometimes the software's not the problem, and the hardware is. Some older CD-ROM and DVD-ROM drives can't work with the latest anti-copying software. Game publishers are advising people who experience problems to get the latest firmware update, but older drives are often unsupported.

So where does that leave the consumers who legitimately purchased a game they're now unable to play? Ubisoft, publisher of *Far Cry*, told the Dog that if a consumer has exhausted all troubleshooting methods, a replacement or exchange is possible. Atari, publisher of *UT2004*, says it has a special executable that should correct the problem for most consumers, but the executable must be obtained by directly calling Atari's support line.

While some of the blame should fall on the game publishers and the anti-copying vendors SecuRom and SafeDisc, much blame also rests on the shoulders of game pirates who have put the publishers in this precarious position. The Dog has this message: If you love PC games, buy them. Woof.

People who run virtual CD programs will never know this kind of paradise, thanks to a new generation of copy-protection schemes.

> *"I DON'T KNOW WHERE WE'LL BE COME LAN-PARTY TIME IF WE CAN'T USE UT2004. WE MIGHT HAVE TO REVERT TO PLAYING, UGH, COUNTER STRIKE."*

DEAR DOG: The *Far Cry* demo was fun to play, and I would buy the game except for the tiny warning at the bottom of Ubisoft's shopping site: "This game contains technology intended to prevent copying that may conflict with some disc and virtual drives."

I understand the need for copyright protection, but will Ubisoft refund my money when its game refuses to run on my drive, or will I be bounced back and forth between software company and retailer? Watchdog, please warn the public.

—RON HARPER

TDV Is MIA

DEAR DOG: My fiancé gave me a 17-inch TDV Vision LCD monitor as a Christmas gift last year. She purchased it at a Tiger Direct warehouse in a nearby suburb. It worked for about five weeks and then began flickering. I tested the monitor on another computer and it did the same thing. I tried calling the manufacturer but the phone number was disconnected. The company's web site is also gone. I still have the manufacturer's three-year warranty. Did TDV Vision close up shop leaving me and other customers in the dark or are they still in business? I would appreciate any help getting in touch with them so I can send in my monitor for replacement or repair.

—JOHNNY

THE DOG RESPONDS: TDV Vision has apparently blinked out like a 10-year-old 14-inch monitor, but there may be some hope for non-CRT owners.

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Lik-Sang's Xbox-to-PC converter is no knockoff, and full driver support is available.

Between the time Johnny wrote the Dog and when TDV's web site went under, monitor company Advueu has sprung up offering support. In a statement on TDV's web site, Advueu's president Larry Wei writes: "Effective February 1, 2004, Advueu Technology Inc. has assumed full service and support for TDV Vision products for the duration of their original warranty. All non-CRT products, including LCD monitors, LCD TVs, and Tablet PCs, will be supported and serviced by Advueu at no charge during the remainder of the warranty. Customers of TDV Vision may contact Advueu Technology for support and return authorizations by phone at 909.598.9077, by fax at 909.348.0630, or online at www.advueu.com. While Advueu is not providing returns for credit for TDV products, Advueu will repair or replace defective equipment covered under the original TDV warranty."

Wei, who was traveling abroad at the writing of this article, could not be reached for comment, but an Advueu employee the Dog spoke with confirmed that the company has taken over warranty for TDV's products. He attributed Johnny's problems to the transition period. The employee also said Advueu did not actually make TDV's products but has enough replacement parts to accommodate the warranties and repairs. The employee also said the warranty was good on any TDV LCD monitors and Tablet PCs still on store shelves.

More details on the exact terms of the deal were not available and the Dog was unable to reach the president of TDV for comment. Existing TDV customers should be comforted by the continuing warranty period, but potential customers should probably steer clear of older TDV components for now.

Not Knockoffs

DEAR DOG: I'm a support rep from Lik-Sang.com's forums (**www.lik-sang.com**). I read in your March column that a reader complained about Code Underground going under. In response, you mentioned "another company selling a knockoff cable." Many people have falsely blamed Lik-Sang for Code Underground's problems.

Rest assured the [Xbox adapter] cable sold at Lik-Sang is not a "knockoff" but rather a factory-made cable, as opposed to the home-made cables of other companies. Lik-Sang is a successful company in Hong Kong that won't disappear anytime soon, and we have a forum with support reps like me and many other knowledgeable users who can answer support questions about the Xbox adapter or any of the company's other console game adapters.

As a matter of fact, we have a sticky post which has not one but three working Xbox controller drivers (including an archived copy of Code Underground's driver), and the independently developed XBCD driver we have linked is the best one available.

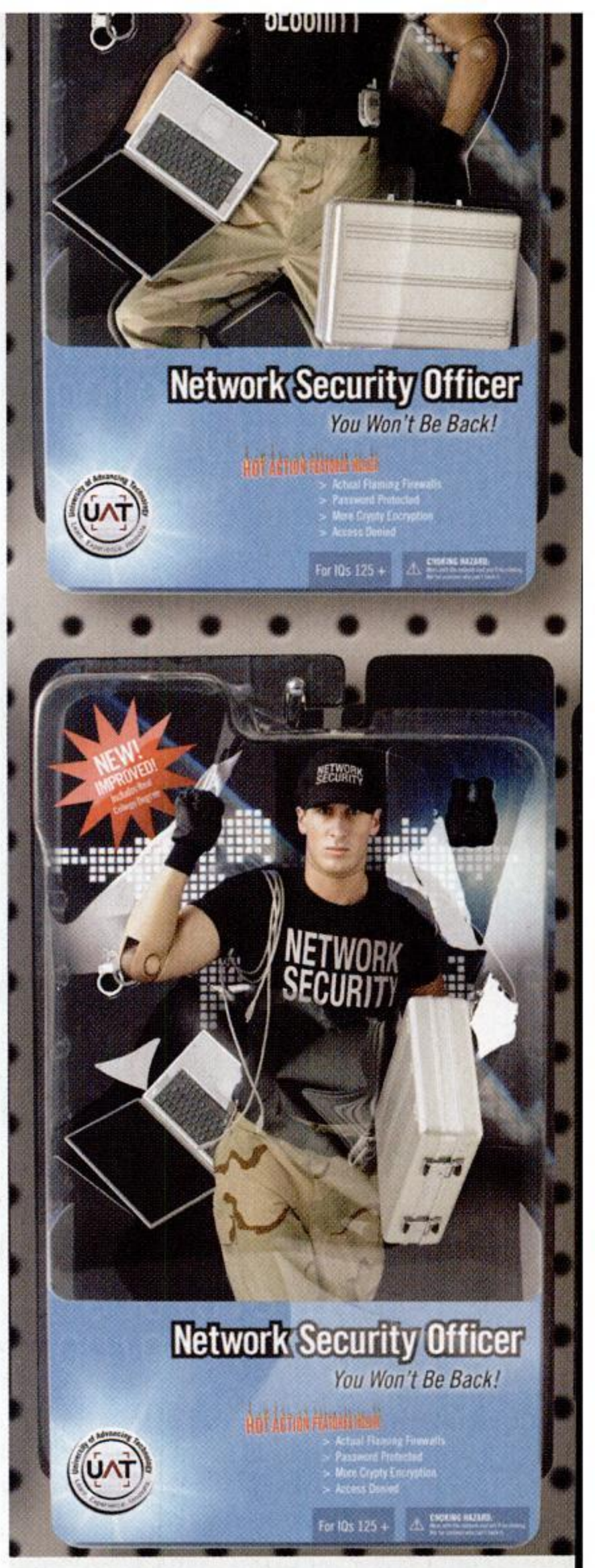
We have no reason to, or interest in, linking to another site for support requests as we possess greater resources to solve users' problems. Also, Lik-Sang cannot include a driver disc with the adapter because: 1) There are three different drivers, and the best one is updated frequently; and 2) the drivers are copyrighted. I think if you try the Lik-Sang Xbox adapter with the XBCD driver we have provided in the forums, you will find it's the best around.

—TJ

"REST ASSURED THE CABLE SOLD AT LIK-SANG IS NOT A 'KNOCKOFF' BUT RATHER A FACTORY-MADE CABLE, AS OPPOSED TO THE HOME-MADE CABLE OF SOME COMPANIES."

THE DOG RESPONDS: Noted. On a related issue, one of the Code Underground creators told the Dog the site is expected to make a comeback, but as of press time, www.codeunderground.com was still coming up empty. As TJ said, drivers for the Code Underground converters are available at Lik-Sang.com. ■

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **watchdog@maximumpc.com**. The Dog promises to get to as many letters as possible, but only has four paws to work with.



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"The Holy Grail of mobile computing - user upgradeable graphics - has been unearthed in Alienware's Area-51m notebook!"

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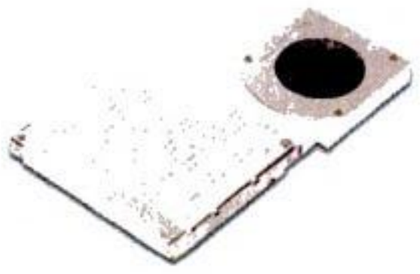

The innovative Area-51m overcomes the technology barrier that has faced mobile gamers for years: graphics upgradeability. The Area-51m now features Do-It-Yourself Upgradeable Mobile Graphics Technology, which extends the life of your mobile gaming system. The swappable video module functions like a desktop video card, allowing you to upgrade your system when new technology becomes available.

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We perform extensive Lab tests on a variety of components with one goal in mind: helping you accelerate your PC to all-new performance levels!

The tension in the air was palpable as the Maximum PC Lab staff gathered to present their findings. For months, we had tested, analyzed, compared, poked, and prodded a sundry assortment of components and technologies. Now it was the moment of truth, the meeting where each editor would discuss his experiments and why they were worthy of inclusion in our annual Speed issue.

As you might imagine, this is one tough meeting. On several occasions, editors have strutted in cocky and sure, only to exit wailing, their pride in tatters because their Lab tests were deemed "sucky." Hey, coming up with a series of experiments creative and practical enough to wow this crowd is no easy task.

Let's be clear: The overarching mission of our annual Speed issue is to isolate and then analyze all manner of components and technology with a singular goal in mind: determining optimum PC configurations for speed. In these tests, we emphasize real-world scenarios over clinical lab results, because the upshot of this special report is to help you, gentle reader, make the best possible decisions for upgrading your PC.

This upshot makes all the blood, sweat, and tears worthwhile.

— THE MAXIMUM PC STAFF

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Are Two CPUs Better Than One?

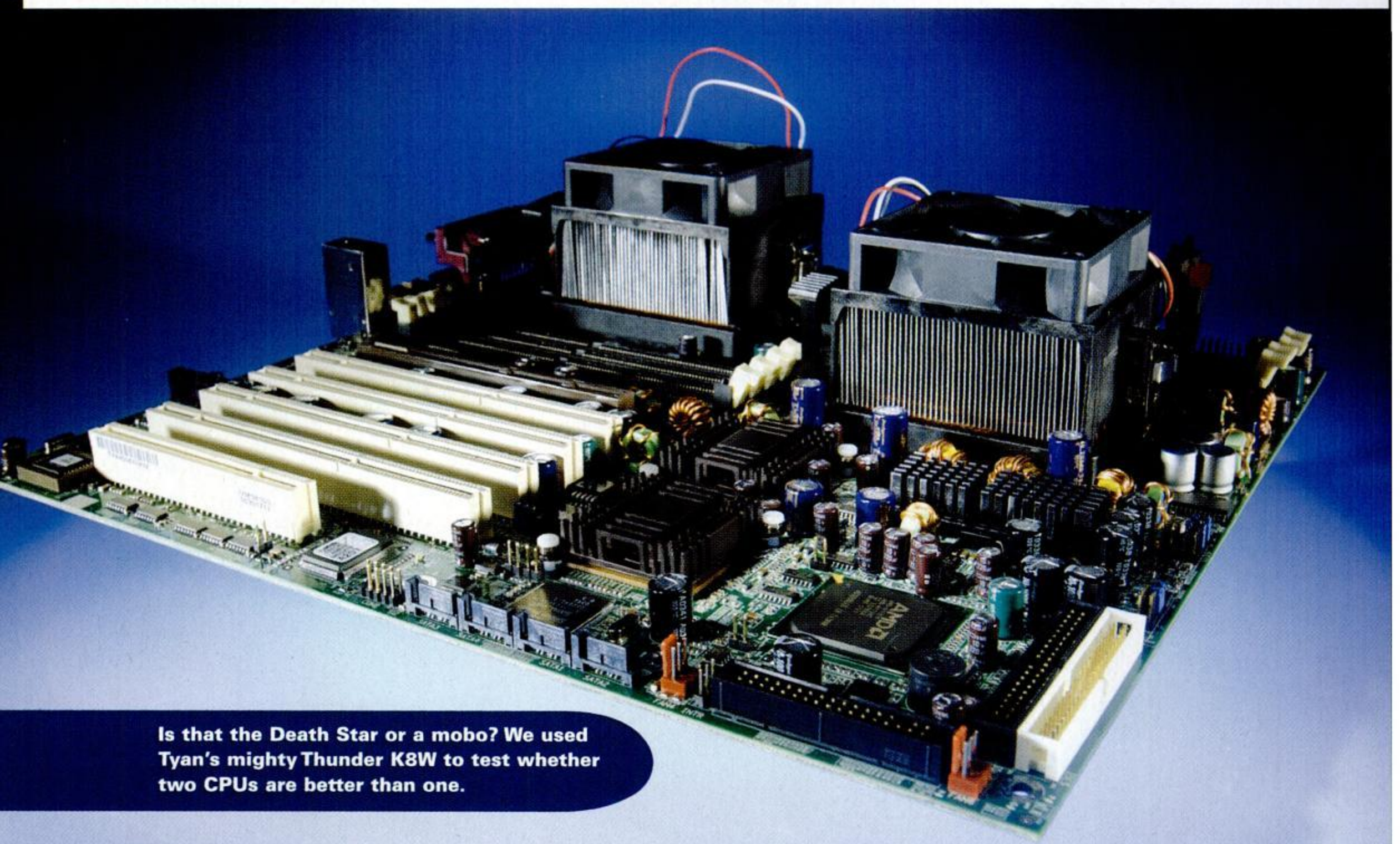
The test: Two CPUs are better than one, right? That's what most people believe. To test this hypothesis, we used one big mofo of a mobo: Tyan's Thunder K8W, stuffed with a pair of AMD 2.2GHz Opteron 248 CPUs. Unlike the Xeon CPU, which uses a shared system bus for memory access, the Opteron's nonuniform memory architecture (NUMA) has a separate point-to-point connector for each CPU's memory access, which theoretically results in faster performance. (Unfortunately, the architecture of the Thunder K8W isn't recognized by the 32-bit version of Windows XP, so we won't see any increased performance from NUMA until Microsoft gets the 64-bit version of its OS.)

To keep the two CPUs happy, we outfitted each with a pair of 512MB registered DDR400 RAM modules. By running separate modules, the AMD 8000-series chipset is able to run in 128-bit mode interleaved for improved memory access. We loaded a fresh install of Windows XP Pro with SP1 onto a 250GB Western Digital WD2500JB drive and paired it with an ATI Radeon 9800 Pro card and the Catalyst 4.3 drivers. We tested both the dual- and single-CPU setups with a wide variety of software.

The results: Lab tests prove that two CPUs can indeed be better than one. The key word here is *can*. Not every application takes advantage of multiple processors, and some that do don't add a whole lot of performance. Take Wolfram Research's *Mathematica 5* as an example. One CPU, two CPUs, or four CPUs makes no difference to this number-crunching app—that second proc might as well be a college buddy crashing on your couch. Sadly, *Mathematica's* zero percent increase with dual CPUs is representative of what you'll get with most of the apps and games on the market today. While the benchmark chart on the opposite page indicates faster performance across the board for the two-proc rig, if you look closely, you'll see that, more often than not, the difference is minimal.

Quake III Arena is the sole odd duck of the bunch. This golden oldie of a 3D shooter actually offers some limited (but quirky) two-processor support. It's not a fully supported feature, but we did witness a small performance bump, which is more than most games will give you. On the downside, however, the frame rates for *QIIIA* were far below what we get on our single-processor zero-point system.

Adobe spent a lot of time and money to retool *Premiere* into *Premiere Pro*, and the result is much improved multi-threading support. But in our tests, the second processor netted just an 11 percent increase in speed. That's not bad, but it's also not great when you factor in the cost of running a two-



Is that the Death Star or a mobo? We used Tyan's mighty Thunder K8W to test whether two CPUs are better than one.

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HOW HIGH CAN YOU OVERCLOCK A CPU?

The test: If a 3.2GHz CPU cooled to minus-20 degrees Celsius can be overclocked to 3.8GHz, what happens if you make it even cooler, say minus-100 C? Do the limits of overclocking scale with colder temperatures?

The results: OK, we admit it—the Lab is outfitted to handle many scenarios, but cooling a CPU to minus-100 is not one of them. So we turned to the CPU makers themselves. While neither AMD nor Intel wanted to disclose a whole lot of details, we did get enough information to answer the question.

AMD's position is that there's simply no guarantee you'll gain more clock speed as you incrementally cool your CPU; the company also notes that performance isn't measured in just raw megahertz.

Intel was a little more forthcoming, saying you can get a near linear scaling of speeds with temperature. It's just that getting there is the problem. Consumer CPUs aren't rated for extreme low temperatures and the problems they can cause, such as condensation. In fact, Intel says you're only supposed to take its consumer procs to 5 degrees Celcius, or 41 degrees Fahrenheit. Any lower and they're no longer guaranteed to work. Intel does make CPUs for colder environments, but only for specially contracted purposes (like, say, the Ice Station Zebra Lab).

proc PC. *Photoshop 7.0* offers pretty much the same story: Only in certain filters does the application warm up the second processor. Most of the time, the extra $800 you spent is just draining electricity.

Does this mean two CPUs aren't worth the money? Not necessarily. If you have a need for the few applications that actually use two processors to their fullest extent, the money is well spent. One case in point is Newtek's *LightWave 3D 7.5*. This pro-level modeling and rendering app runs about 100 percent faster with a second processor. We also saw the second processor pay off reasonable dividends in *SYSmark 2004*, where the score jumped by about 25 percent (proof that the new *SYSmark 2004* is far better than its predecessor at measuring the performance impacts of multitasking).

Indeed, dual processors do make a difference if you run, say, Microsoft *Word*, an antivirus scanner, and an MP3 encoder at the same time. In fact, multitasking is the number one reason to run a dual-proc box.

Something the benchmark numbers don't make clear is the "smoothness" that dual-proc users experience. While it's easy to choke up a single-processor and cause application sputtering by multitasking, it doesn't occur very often on a two-CPU machine. The closest you can come to such effortless multitasking on a single-proc box is with Intel's Hyper-Threading, which intelligently distributes the workload of a single CPU for a similarly smooth user experience.

So should you invest in an extra CPU? If you're primarily a gamer and your application work is limited to MP3 encoding, web browsing, and Microsoft *Word*, the money and power you'll spend isn't worth it. Plus, next-gen features such as DDR2, PCI Express, faster busses, and newer CPUs will debut on single-processor mobos. But, if the applications you use are tailored to use more than one CPU and you're getting paid by the job, than the second proc will pay for itself in no time.

CPU PERFORMANCE	TWO OPTERON 248s	ONE OPTERON 248
Premiere Pro (sec)	**665**	741
Photoshop 7 (sec)	**260**	277
Quake III Arena (fps)	**275**	260
PCMark 2004 CPU	**5,223**	4,078
Mathematica (sec)	558	558
LightWave 3D 7.5c (sec)	**52.8**	97.3
SYSmark 2004	**207**	166

Best scores are bolded.

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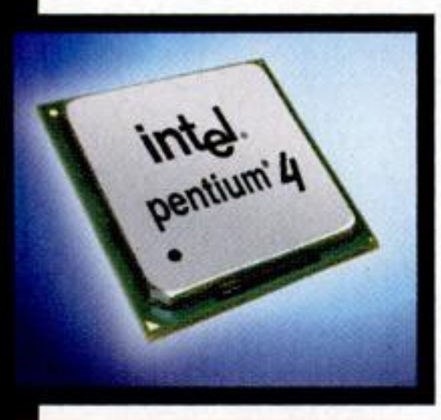
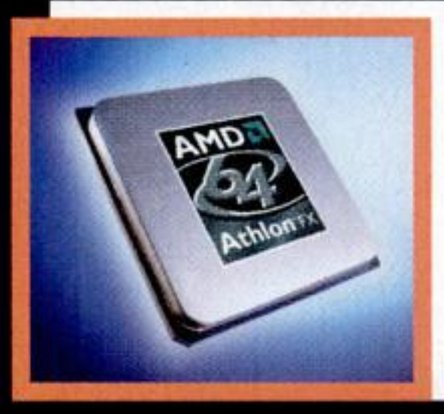
Which is Faster—Intel's P4EE or AMD's FX-53?

The test: When people ask us questions about processors, they don't want to know which CPU is cheaper or which gives the best return on investment. No. The only question that matters is which CPU is faster: Intel's Pentium 4 Extreme Edition or AMD's Athlon 64 FX-53? To find out, we ran the FX-53 against the 3.4EE on four leading chipsets: Intel's 875P, VIA's PT880, VIA's K8T800, and nVidia's nForce3 150. We used the same basic components and drivers for each platform, although we did have to use registered memory for the FX because of its RAM requirements.





CPU PERFORMANCE	2.4GHZ FX-53	2.4GHZ FX-53	3.4GH P4EE	3.4GHZ P4EE
CHIPSET	VIA K8T800	NFORCE3 150	INTEL I875P	VIA PT880
SYSmark2004 Overall	193	183	**196**	193
Content Creation Overall	222	213	**229**	225
Office Productivity Overall	**167**	158	**167**	165
Photoshop 7.0.1 (sec)	266	266	**254**	270
Premiere Pro (sec)	678	681	**515**	527
Mathematica (sec)	**504**	508.4	607.7	609.9
MusicMatch 8.1 (sec)	258	259	**225**	**225**
Comanche 8x6 (fps)	73.89	73.1	**74.22**	73.06
AquaMark CPU	9,898	**10,393**	10,391	9,850
3DMark2001 SE	20,349	**20,419**	19,898	19,655
3DMark 2003 CPU	779	807	**820**	793
Jedi Academy 12x10 (fps)	**47.5**	41.3	46.2	46.3
Unreal Tournament Flyby (fps)	**321.9**	315.4	293.5	291.5
Quake III "Four" (fps)	470	444	460	**498**
SiSoft Sandra 2004 RAM Composite (MB/s)	5,575	**5,809**	4,555	4,658

Best scores are bolded.

The results: Our Lab tests produced mixed results. Instead of a nice tight grouping of victories in a single column that would clearly indicate which CPU is faster, the wins were all over the map. The P4EE won the largest number of tests, but the FX-53 also notched its share of victories.

With these kinds of results, the only thing that's clear is that we cannot pronounce a winner. Subjectively speaking, though, the Athlon 64 FX "feels" faster in games that don't have built-in benchmarks, while the Pentium 4 Extreme Edition "feels" faster in most applications that don't stress floating-point math. The P4EE is also faster in newer apps, while the Athlon 64 FX is faster in older apps.

How much faster is the Athlon 64 FX than the Athlon 64 3400+?

The test: We already know the Athlon 64 FX-53 is fast, but exactly how much of a performance boost does its dual-channel RAM give you over a plain-Jane Athlon 64? To find out, we took an Athlon 64 3400+ (the fastest available) and compared it with an Athlon 64 FX-53. And because we were curious, we also compared it with an Athlon 64 FX-51.

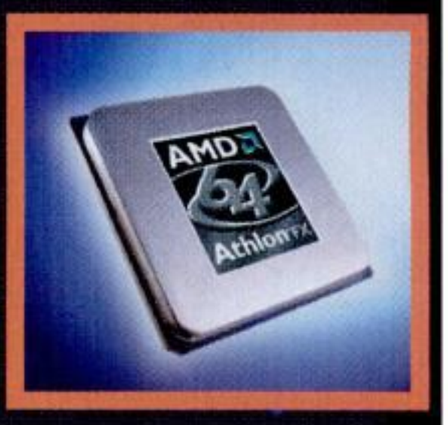
If you haven't been following current CPU events, you can't use an Athlon 64 in a motherboard designed for the Athlon 64 FX and vice versa. Because core-logic chipsets impact performance, we used the same chipset in both Socket 754 (for the Athlon 64) and Socket 940 (for the Athlon 64 FX) in order to isolate the variable of CPU performance. An nForce3 150 powered both our Asus SK8N FX board and our Soyo CK8 A64 motherboard. Both rigs used Western Digital WD2500JB hard drives, ATI Radeon 9800 Pro cards, and the same amount of Corsair Micro DDR400 memory (the FX requires registered RAM).

CPU PERFORMANCE	2.2GHz 3400+	2.4GHz FX-53	2.2GHz FX-51
Quake III "Normal" Four (fps)	450	**484**	450
SiSoft Sandra RAM Composite	3,041	**5,685**	5,609
Premiere Pro (sec)	751	**684**	743
3DMark 2001 SE	19,990	**20,188**	19,820
AquaMark 3 CPU	9,638	**10,355**	9,829
3DMark 2003 CPU	757	**836**	780
UT2003 Fly By 6x4 (fps)	309.3	**329.9**	312.3
SYSmark 2004 Overall	173	**184**	174
AquaMark CPU	9,898	**10,393**	10,391
3DMark2001 SE	20,349	**20,419**	19,898
3DMark 2003 CPU	779	807	**820**

Best scores are bolded.

The results: We've always known that the Athlon 64 3400+ is a peppy CPU but we were still surprised by just how fast this proc performed. The Athlon 64 FX-53 still holds the title as the fastest AMD CPU, but its 7-to-10 percent performance advantage is less likely the result of its dual-channel memory controller than its 200MHz clock speed advantage. The synthetic memory benchmarks show the FX-51 still outrunning the Athlon 64, but our real-world tests indicate this performance differential doesn't mean squat. Perhaps down the road we'll see more impressive real-life results from the Athlon FX line's incredible memory performance capabilities. For now, what benchmarks the FX-53 wins, it does so by a slim 2-to-3 percent margin.

What's holding back the FX? The primary suspect is the slower registered RAM that the Athlon 64 FX requires (remember, the A64FX is based on the server-orientated Opteron). AMD is expected to finally nix the requirement for registered RAM when it moves both the A64 and A64 FX to the new Socket 939 later this year.



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Is It Worth It To Spend the Extra Money on a Highfalutin' USB Cable?

The test: You've seen the ads for so-called "high-speed" USB cables, but are they any different from their garden-variety counterparts? Is it worth the money to buy a cable with a more promising label or will the plain-Jane USB cable you have lying around do the job just fine? This is what we set out to discover in this speed trial.

Our first order of business was to acquire three different USB cables of varying expense and purported attributes. The first cable, heretofore known as the "regular" cable, was pulled from a tangle of cables we found in the dark, dusty, nether regions of the Lab. The second cable is a brand-new Hi-Speed USB 2.0 cable. The third cable is a pricier "high-speed" USB cable made by Monster Cable—pricier, no doubt, because it offers features galore, including a "PowerFlow" LED that flashes when it's connected. Impressive, to be sure.

To evaluate differences among the three cables, we performed a 2GB file transfer from our test system's hard drive to a USB 2.0 backup drive. We performed the file transfer with each cable three times and rebooted after each file transfer. The results posted here are the average of all three transfer times for each cable.

The results: Well, well, well. It looks like the fancy-pants cables were just about the same speed as the older, supposedly inferior cable. Score one for the little guy! While the regular cable was slower than the high-speed cables by a few seconds overall, this is hardly a night-and-day difference. And certainly not worth the cost differential—a regular USB cable costs about $3 and the Monster Cable costs $50. While the difference in speed between "regular old" USB *devices* and the newer spec'd USB 2.0 is irrefutable, it appears there is little difference among the USB cables that carry data to and from those devices. Except maybe pizzazz. In the Monster cable's defense, it dominated in the benchmark category "Has an LED that flashes when connected." And it's the only cable we know of that sports a "Hex Mesh" jacket, "SingleHelix" construction, and 24-karat gold connectors.

But when it comes to data transfer rates and integrity, good old-fashioned Joe Cable gets the job done.

USB BENCHMARKS	REGULAR CABLE	HI -SPEED USB 2.0 CABLE	MONSTER CABLE
Transfer times (sec)	7:52	7:44	7:41

Can a vanilla USB cable hang with these fancy cables? We find out.

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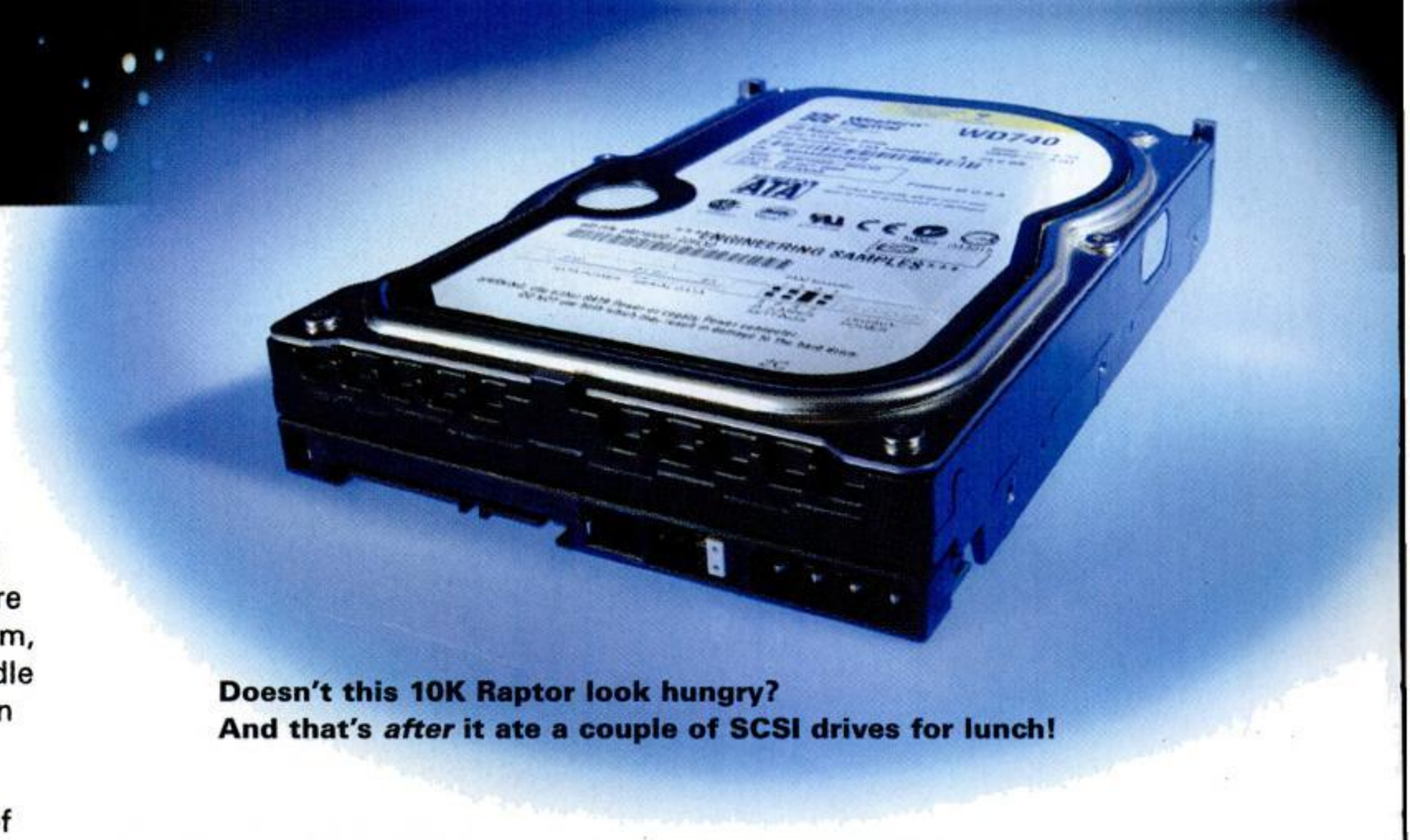
Is Serial ATA Faster Than SCSI?



Doesn't this 10K Raptor look hungry? And that's *after* it ate a couple of SCSI drives for lunch!

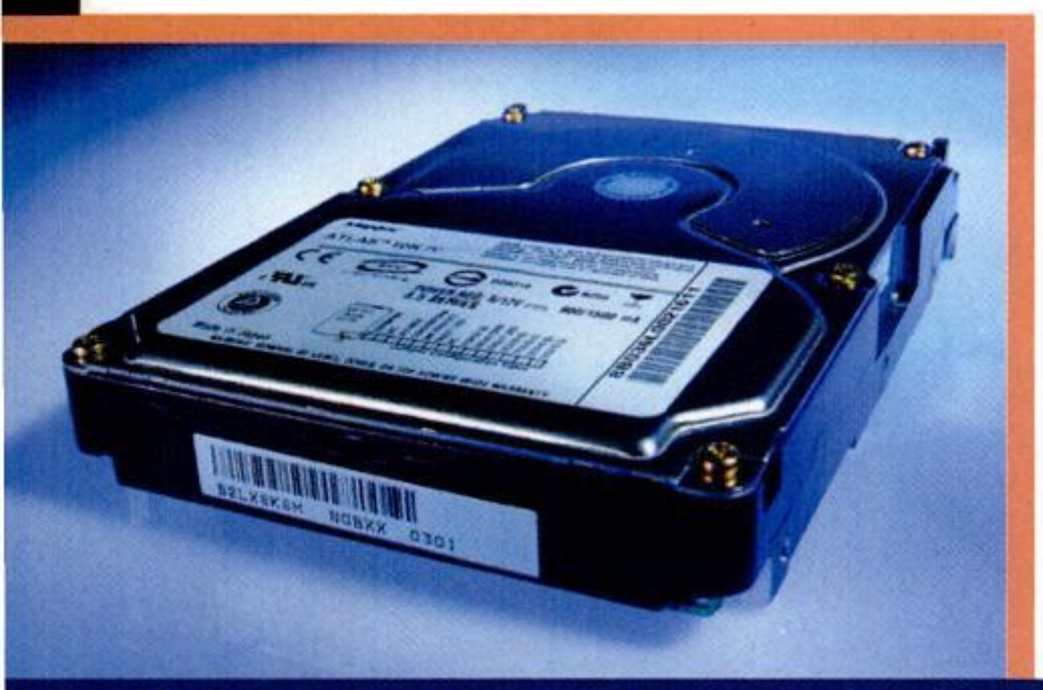
The test: Over the past year, ATA hard drives have acquired features that were previously found only in the SCSI realm, such as 10K spindle speeds, FDB spindle motors, hot-swapping ability, and even vibration controls for rack-mounted drives. Has ATA finally caught up—or surpassed—the long-time defenders of the hard drive performance crown?

To see how ATA stacks up against SCSI we gathered together the best of the best: a 74GB 10,000rpm SATA Raptor from Western Digital to defend the ATA title, and Maxtor's record-breaking Atlas 10K Ultra 320 SCSI drive to represent its ilk. And for kicks, we threw in a Maxtor Atlas 15K Ultra 320 SCSI drive as well, because 15K drives are fun to test and represent the pinnacle of hard drive performance. It should be noted that while the two 10K drives sport capacities of 74GB and 73GB, respectively, the 15K SCSI drive has a capacity of just 18GB, given its intended use in a server environment (smaller drives are preferred because there's less data to replace if a failure occurs).

Testing consisted of Simplisoft's *HD Tach 2.61*, which tests sequential read speed, write speed, random access time, and burst speed. The SCSI drives were connected to an Adaptec 29320A-R Ultra 320 controller, and the Western Digital SATA drive was connected to our test system's onboard SATA controller, care of the ICH5 south bridge chipset on an Intel 865GBF motherboard.

The results: Going into this test, we thought Western Digital's 10K Raptor would hold its own; instead it actually dominated. In short, the 10K Raptor handed the 10K Atlas its SCSI ass on a platter. For some strange reason, the Atlas laid down benchmark scores equivalent to those of a high-end 7,200rpm SATA drive. Although the Atlas' seek times were a smidge better than the Raptor's, the latter's average read speed of 62MB/s completely outpaced the Atlas' meager 46MB/sec average. Point, set, and match to the Serial ATA camp.

Perhaps the most surprising result, however, was that the 10K Raptor scored higher average sequential read speeds across its platters than even the 15K Maxtor drive. The fact is, these high-velocity SCSI drives aren't made for sequential transfers, as their high rotational velocities are meant to provide enormous benefits in multi-user environments with heavy random access workloads. In random access testing, the 15K SCSI drive handily outperformed the 10K drives. If you subtract the standard 2ms of latency—the time it takes the drive to pinpoint a specific sector on the platter—from the 15K's access time of 5.5ms, you end up with a random access time of 3.5ms. That is fast access, for sure.



Maxtor's Atlas 10K is the fastest 10K SCSI drive around, so we pitted it against the fastest 10K ATA drive in a race "for pinks." It lost.

HARD DRIVE PERFORMANCE	10K ATA RAPTOR (74GB)	10K SCSI ATLAS (73GB)	15K SCSI ATLAS (18GB)
HD TACH			
Average read speed (MB/sec)	**61.7**	46.8	55.1
Average write speed (MB/sec)	36.1	34.3	**41**
Burst speed (MB/sec)	**111**	97	100
Random access time (ms)	7.9	7.2	**5.5**

Best scores are bolded.

At the top of the hard drive food chain sits the Maxtor Atlas 15K. Hopefully ATA drives will evolve to reach its unbelievable seek times.

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Which is Faster: a Two-, Three-, or Four-Drive RAID Array?

The test: While most RAID arrays consist of two drives, we wondered how much additional performance could be achieved by moving to a three- or four-drive array. To test this theory, we gathered four Maxtor 250GB Ultra series parallel ATA drives and tested a single drive first, then RAID arrays consisting of two, three, and four drives. The drives were connected to a Promise Fast Trax TX4000 ATA PCI RAID controller using an Intel 865GBF chipset on an Intel motherboard. To determine each array's overall performance we ran *HD Tach* three times on each drive configuration and recorded the results.

The results: The results were interesting for several reasons. While the two-drive array delivered stunning performance, adding a third drive practically maxed out the 32-bit PCI bus. The three-drive array achieved a maximum burst speed of 127MB/sec, which is damn close to the 133MB/sec limit of the PCI bus, which means the drives are simply saturating the bus with data. It also could mean that the three-drive array is capable of transferring data even faster if given more headroom.

Even more interesting than the results of adding a third drive is the discovery that adding a fourth drive results in a performance *drop*. Because the PCI bus was already saturated with just three drives, adding a fourth simply added more overhead to the whole operation, resulting in slower performance overall. Ain't that a bitch?

You might be wondering to yourself how the Serial ATA interface, with its extra 17MB/sec of bandwidth would compare with parallel ATA (150MB/sec versus 133MB/sec). Common sense suggests the increased bandwidth would improve the performance of a four-drive array. However, as long as a controller card, SATA or otherwise, is plugged into the 133MB/sec PCI bus, the bandwidth limitation persists.

RAID PERFORMANCE	SINGLE DRIVE	TWO DRIVES	THREE DRIVES	FOUR DRIVES
HD TACH				
Average read speed (MB/sec)	47	95	**113**	107

Best scores are bolded.

WHAT'S THE FASTEST RAID STRIPE SIZE?

The test: When configuring a RAID array, you have the option of choosing from several different stripe sizes. These data "stripes" are the chunks of data that files are broken into before being written to each drive in the array. Stripe size options usually range from 16K up to 128K, but which stripe size is best?

To find out the impact of stripe size on performance, we grabbed two Maxtor 250GB Ultra series drives and attached them to a Promise ATA RAID controller. We configured a striped array for each of the controller's stripe-size options, ran *HD Tach* on each array, and isolated the read speed results. We also transferred three differently sized batches of files from our test system's hard drive to each RAID array and recorded the transfer times.

The results: Testing showed there isn't a huge difference in performance among stripe sizes, at least in the 16K-to-128K range our controller allows (some controllers offer stripes as large as 512K). But the little performance advantage we did observe scaled with the smaller stripe, so if your array is set to a "default" stripe size you might want to make sure it's the minimum.

STRIPE SIZE COMPARISONS	16K STRIPE	32K STRIPE	64K STRIPE	128K STRIPE
HD TACH				
Average read speed (MB/sec)	**97**	**97**	95	95
*Small file write (sec)	32	**30**	31	33
**Medium file write (sec)	**71**	75	74	76
***Large file write (sec)	**21**	23	**21**	22

Best scores are bolded.
*Test involved transferring 94.6MB of files averaging 20K-35K.
**Test involved transferring 2.27GB of files 4MB-6MB.
*** Test involved transferring one 749MB file.

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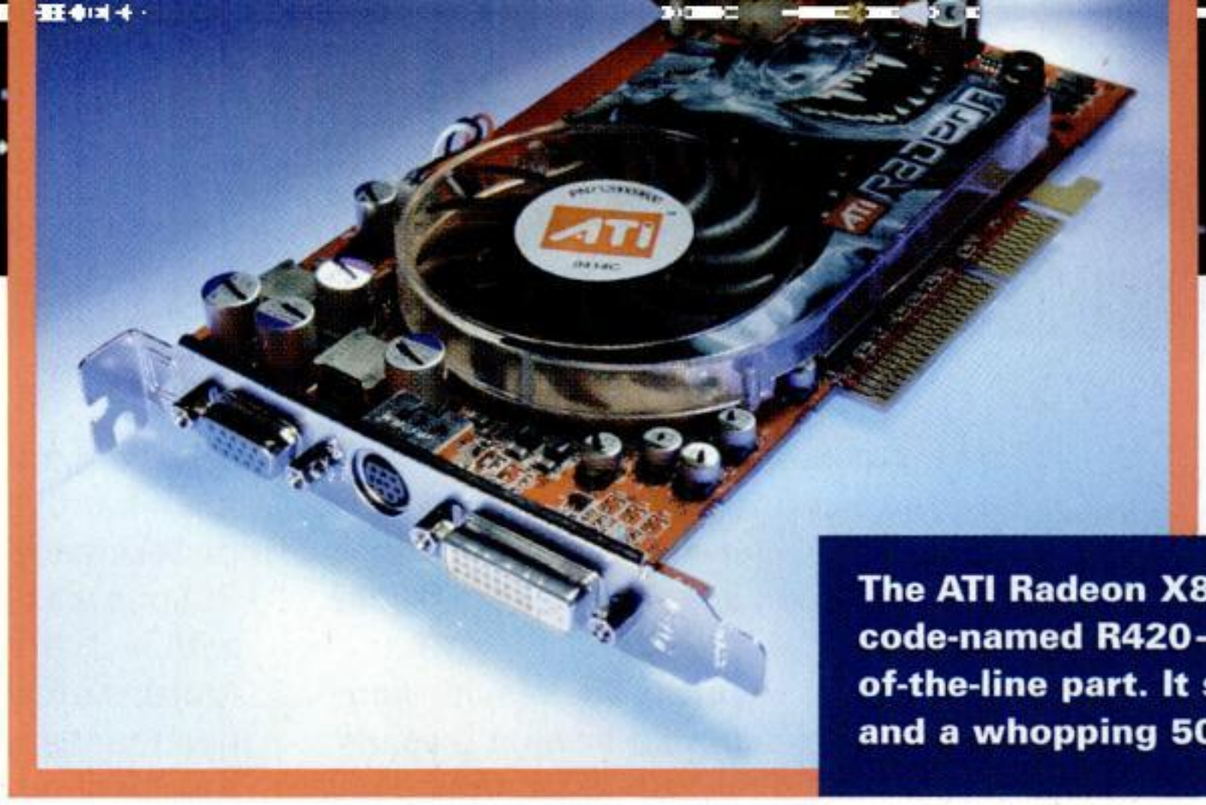
Which Is Faster: nVidia's GeForce 6800 Ultra or ATI's Radeon X800 XT?



The ATI Radeon X800 XT—formerly code-named R420—is ATI's next top-of-the-line part. It sports 16 pipelines and a whopping 500MHz core clock.

The test: Last month, we introduced nVidia's next-gen part, formerly known as NV40: the GeForce 6800 Ultra. This month, we pit that nVidia card against an early version of ATI's next-generation part—the Radeon X800 XT—to see which next-gen part is faster. Because this is the Speed issue, we're only concerned with one attribute: raw, unadulterated speed. We care not about visual quality, feature support, size, and noise level—that's another story. All that matters is frame rate.

To test the next-gen cards, we used every game we could get our hands on that uses programmable shaders. Now that we finally have some next-gen titles that use DirectX 9 programmable shaders, we'll be damned if we don't put them to use. We tailored our tests to be equal parts real-world performance measurements and synthetic benchmarks.

Our benchmarks were the standard *Halo* time demo at 1600x1200, *Far Cry* at 1280x1024 (Very High quality with water set to Ultra High), *Unreal Tournament 2003* Flyby at 1600x1200, *Aquamark3* at default settings, *3DMark2003* at default settings, and *3DMark2003's* Pixel Shader 2.0 test. For games that don't include a benchmark utility, we used *Fraps* (a third-party frame rate counter) and tested the frame rate while we walked forward in-game for a minimum of 35 seconds.

The results: The ATI Radeon X800 XT and the GeForce 6800 Ultra each have 16 pipelines and it shows. (The previous-generation Radeon had eight pipelines, and the last-generation GeForce had just four.) On many of the tests we ran, both the Radeon X800 XT and the GeForce 6800 Ultra ran twice as fast as the Radeon 9800 XT—the fastest last-gen card!

So it goes without saying that both the GeForce 6800 and Radeon X800 XT spank the older generation of graphics cards, but what you really want to know is how they compare with each other. Should you buy ATI or nVidia? The benchmarks split evenly down the middle, but you'll notice that the ATI card wins all the real-world tests, while the nVidia card wins almost all the synthetic benchmarks. This bears closer examination.

Despite a slower core clock speed, the nVidia card has a few advantages. With slightly more memory bandwidth and an additional pixel shader unit in each pipeline, the GeForce 6800 purrs through tests that emphasize shadow volumes. Also known as stencil shadows, nVidia added the extra pixel processing units to greatly accelerate this effect. An example of a game that uses this 3D effect is *Doom 3*, which uses shadow volumes to render the amazingly realistic shadows you've seen in screenshots. Coincidentally, *3DMark 2003* Game 2 also makes extensive use of this 3D effect. The GeForce 6800 Ultra's domination over the new Radeon in Game 2 leads us to believe it will be the best card for *Doom 3*—assuming, of course, that the game actually ships in the next six months.

Looking at the rest of the benchmark results, however, the situation isn't as cut and dried. Although the X800 does win most of the real-world tests—we'll talk about *Halo* in a second—it wins by just a few percentage points. In *Far Cry*, which makes the heaviest use of programmable shader technology that we've seen to

VIDEOCARD PERFORMANCE	GEFORCE 6800 ULTRA	RADEON X800 XT	RADEON 9800 XT
Halo 1.02 (fps)	35.03	**59.75**	28.1
Far Cry 1.1 (fps)	62.0	**65.8**	53.0
UT2003 Flyby (fps)	261	**275.5**	127.3
Aquamark3	**63,536**	63,487	45,857
3DMark2003 Game 2	**95.0**	88.5	45.0
3DMark2003 Game 4	62.8	**71.2**	37.4
3DMark Pixel Shader 2.0 Test	**156.4**	121	57.2
3DMark 2003 Overall	**11,833**	11,437	6,563

Best scores are bolded. All tests are run on our standard test bed system, an Athlon FX-51 on an nForce3 150 motherboard with 1GB of RAM. 3DMark and Aquamark3 are run at their default settings. UT2003 and Halo are run at 1600x1200. Far Cry is run at 1280x1024.

SPECS	GeForce 6800 Ultra	Radeon X800 XT
Core code-name	NV40	R420
Core clock	400MHz	500MHz
Memory type	DDR3	GDDR3
Memory clock	550MHz	500MHz
Number of transistors	220 million	170 million
Number of pipelines	16	16

The newest card from nVidia—the GeForce 6800 Ultra—has 16 pipelines, but it also includes some special hardware to ratchet up performance in games with stencil shadows, such as *Doom 3*.

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How Fast Does 8x DVD Actually Record?

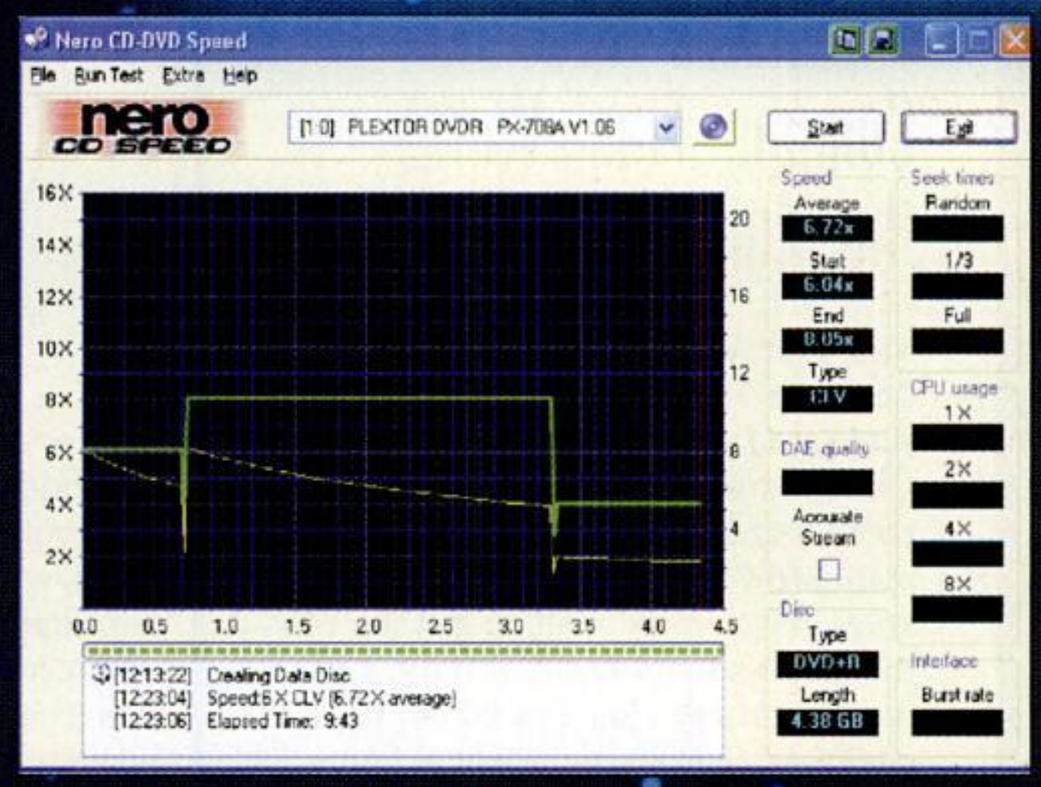
The test: Used by 8x and faster DVD burners, Zone-CLV writing schemes divide the disk into multiple zones and spin the disc slower in the inner rings and faster in the outer rings. Because of this speed variance, we've always wondered exactly how big a speed increase an 8x burner boasts over a 2x and a 4x drive. In order to test how zone-based recording affects disc writing speed, we used Plextor's speedy 708A (firmware revision 1.06) for our DVD burner. We used Ahead's *Nero* (version 6.3.1.6) to adjust the write speed, and Verbatim media to create 4.5GB data DVDs.

The results: The chart speaks for itself—DVD burners experience diminishing returns in performance rates as recordable DVD drives increase their x-speeds. While a 4x DVD burner ran twice as fast as a 2x model, we discovered that an 8x drive was not twice as fast as a 4x drive; it was off by approximately a minute and a half (presumably, 12x drives will suffer an even greater penalty).

Nonetheless, we concluded that higher x-speeds in DVD burners are more valuable than higher x-speeds in CD burners. The most popular application for DVD burners is creating DVD Video, and the higher the bitrate (and thus file size) of the video you burn, the better quality you'll get. Because you'll frequently maximize bitrate in order to burn the entire capacity of a 4.7GB recordable DVD, you'll benefit more from the speed gains at the outer edges.

FORMAT	X-SPEED	TRANSFER RATE	TIME	GAIN FROM PREVIOUS SPEED
DVD+R	8x	10.57MB/sec	8:28	5:52
DVD+R	4x	5.28MB/sec	14:20	9:12
DVD+R	2.4x	2.65MB/sec	23:32	N/A
DVD-R	4x	5.28MB/sec	14:50	14:35
DVD-R	2x	2.65MB/sec	29:25	N/A
DVD+RW	4x	5.28MB/sec	13:51	10:09
DVD+RW	2.4x	2.65MB/sec	24:00	N/A

Higher-speed media may be available by the time you read this. We declined to include prototype high-speed media in these tests. But these figures give you an idea of what to expect.



The naked truth about x-speeds: The yellow line represents the speed of the disc's rotation, and the green line represents the rate at which data is being written. The PX-708A begins writing at 6x until about 700MB into the disc. It then ratchets up to 8x and maintains this rate until 3.3GB into the disc. Finally, it slows down to 4x to make reading data at the outer extremities less error-prone.

As a result, the average x-speed of the drive is actually 6.7x, and that's only when you're writing the full 4.7GB capacity of the disc.

date, the cards run within four frames per second of each other, even with the water reflections set to the Pixel Shader 2.0 Ultra-High mode instead of the Pixel Shader 1.3 fallback mode.

We initially had some problems with *Halo* on our test NV40. We were getting scores as low as 22fps, which just isn't right. It turns out that our motherboard's AGP aperture was improperly set. Once we adjusted the AGP aperture to half of our test system's memory (512MB), the card performed better, but not as well as we anticipated. We fully expect that any kinks with *Halo* and the GeForce 6800 Ultra will be worked out before the card ships.

So the nVidia card has a slight edge when volume shaders are involved, but the ATI card exhibited an equally slight lead in the rest of our Lab tests. This means your purchasing decision will ultimately boil down to those other factors we said we weren't going to talk about: visual quality, feature support, size, and noise level. Logistically, the Radeon X800 XT appears to have an advantage because it's a single-slot solution, and requires only a single power lead. Conversely, the GeForce 6800 Ultra is a two-slot card that requires a monstrous 480W power supply and *two* power leads from your system's PSU.

But don't rush to a conclusion—the GeForce 6800 Ultra has some important features the Radeon X800 XT lacks, namely 32-bit floating-point color and Pixel Shader 3.0 capabilities. If developers plan to support Pixel Shader 3.0, it could mean that programmable shader games that use the spec will look significantly better on nVidia hardware than ATI hardware, which only supports 24-bit floating-point color.

We'll break all this down—and give you the inside scoop on image quality differences between the two cards—in next month's *Maximum PC*. But for now, know this: Both of these 3D cards are lightning fast.

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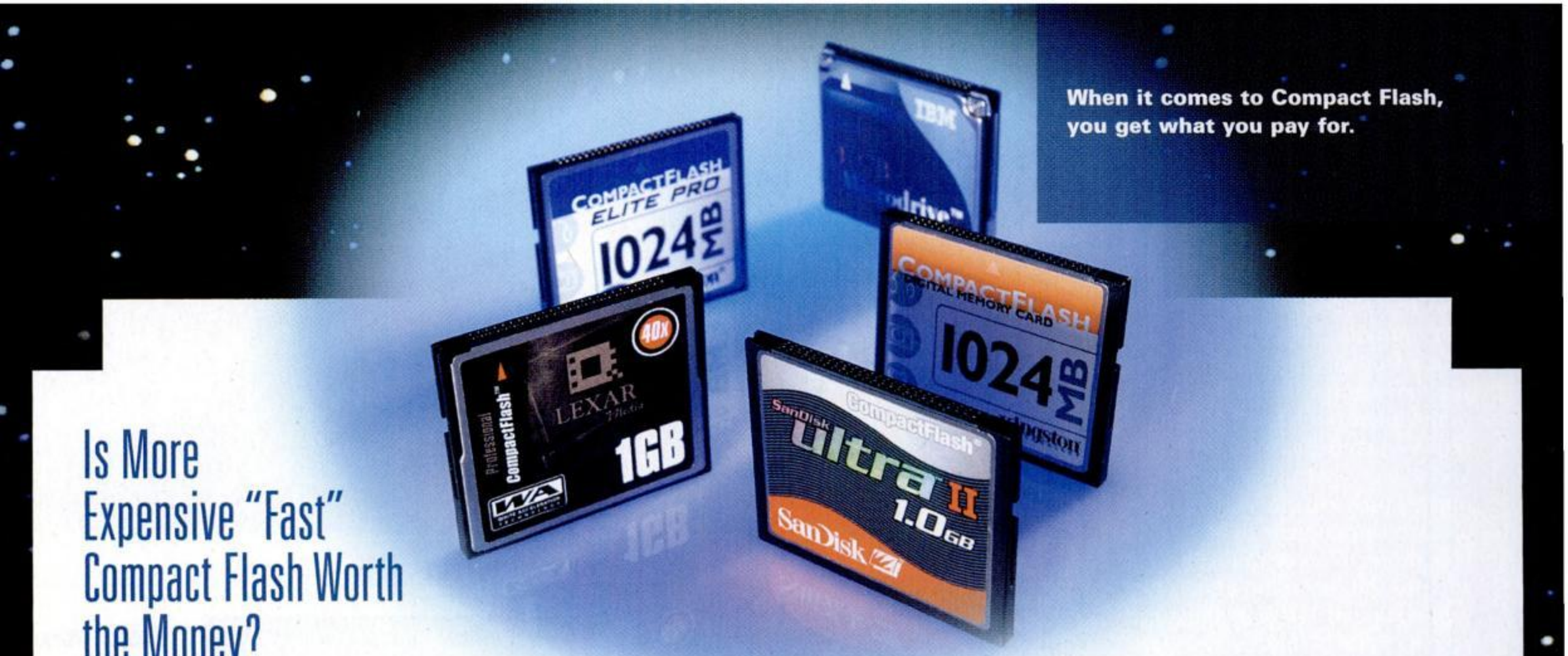

Is More Expensive "Fast" Compact Flash Worth the Money?

The test: Walk into a store to buy Compact Flash memory and you'll be presented with a dizzying array of 40x, Ultra, Extreme, or Elite versions which cost 20 to 30 percent more than the standard Compact Flash. We wanted to know if it's worth shelling out the cash for the faster-sounding CF, or if the special designators are just marketing hype designed to make your wallet lighter.

For our test, we collected a set of CF cards from Sandisk, Lexar, and Kingston. We threw in an old IBM (not Hitachi) Microdrive as a sanity check, and also used a very old 1GB card we'll just label "generic." We used the cards with two different card readers: an Atech USB 2.0 multicard reader and a Lexar FireWire reader.

Because there's quite a bit of controversy regarding the most effective method for testing CF memory, we chose a comprehensive, scattershot approach. First, we ran *SiSoft Sandra's* removable storage test and our own file-copying exercise wherein we transfer a 234MB file. Then, to get real-world results, we used a high-speed Nikon D2H camera and timed how long it took to write a set of 25 images in RAW format and 40 images in JPEG format.

The results: We learned a few lessons from our experiment. The first is that fast cards do indeed matter—especially in photography where a faster write speed can mean the difference between getting the shot and not getting it.

We also found that, in general, write speeds vary more than read speeds. In our file copying tests, for example, the generic card moved 234MB of files as quickly as the expensive cards.

Finally, even among the fast cards, we were surprised by the differences in speed. Sandisk's Ultra II literally ran away with the tests in just about every category, significantly outpacing both Kingston's new Elite series and Lexar's 40x media. (Interestingly, we expected the IBM Microdrive to pull up the rear in our tests, but it actually performed faster than the generic 1GB CF card, which must have been rated for 2x write speeds.)

So, if you care about speed, pay for the faster media. And give serious consideration to Sandisk's Ultra II CF card—it's *ultra*-speedy. ■

CF BENCHMARKS	SANDISK 1GB ULTRA II	KINGSTON 1GB ELITE	LEXAR 1GB 40X	KINGSTON 1GB STANDARD	IBM 1GB MICRODRIVE	GENERIC 1GB
Atech Flash USB 2.0 reader SiSoft Sandra **READ (KB/s)**	2,662	**2,697**	2,662	1,264	**2,697**	1,877
Atech Flash USB 2.0 reader SiSoft Sandra **WRITE (KB/s)**	**2,423**	1,911	1,229	1,604	1,707	546
Lexar FireWire reader SiSoft Sandra 2MB **READ (KB/s)**	12,245	5,154	6,383	**12,527**	4,233	2,492
Lexar FireWire reader SiSoft Sandra **WRITE (KB/s)**	**6,417**	2,697	2,731	1,911	2,901	614
Atech USB 2.0 reader File Copying **WRITE 234MB MP3 (sec)**	**93**	106	109	125	137	337
Lexar FireWire reader File Copying **WRITE 234MB MP3 (sec)**	**30**	70	52	96	61	337
Nikon D2H 25 RAW (sec)	**19**	22	26	41	46	93
Nikon D2H 40 JPG (sec)	**16**	19	24	35	37	86

Best scores are bolded.

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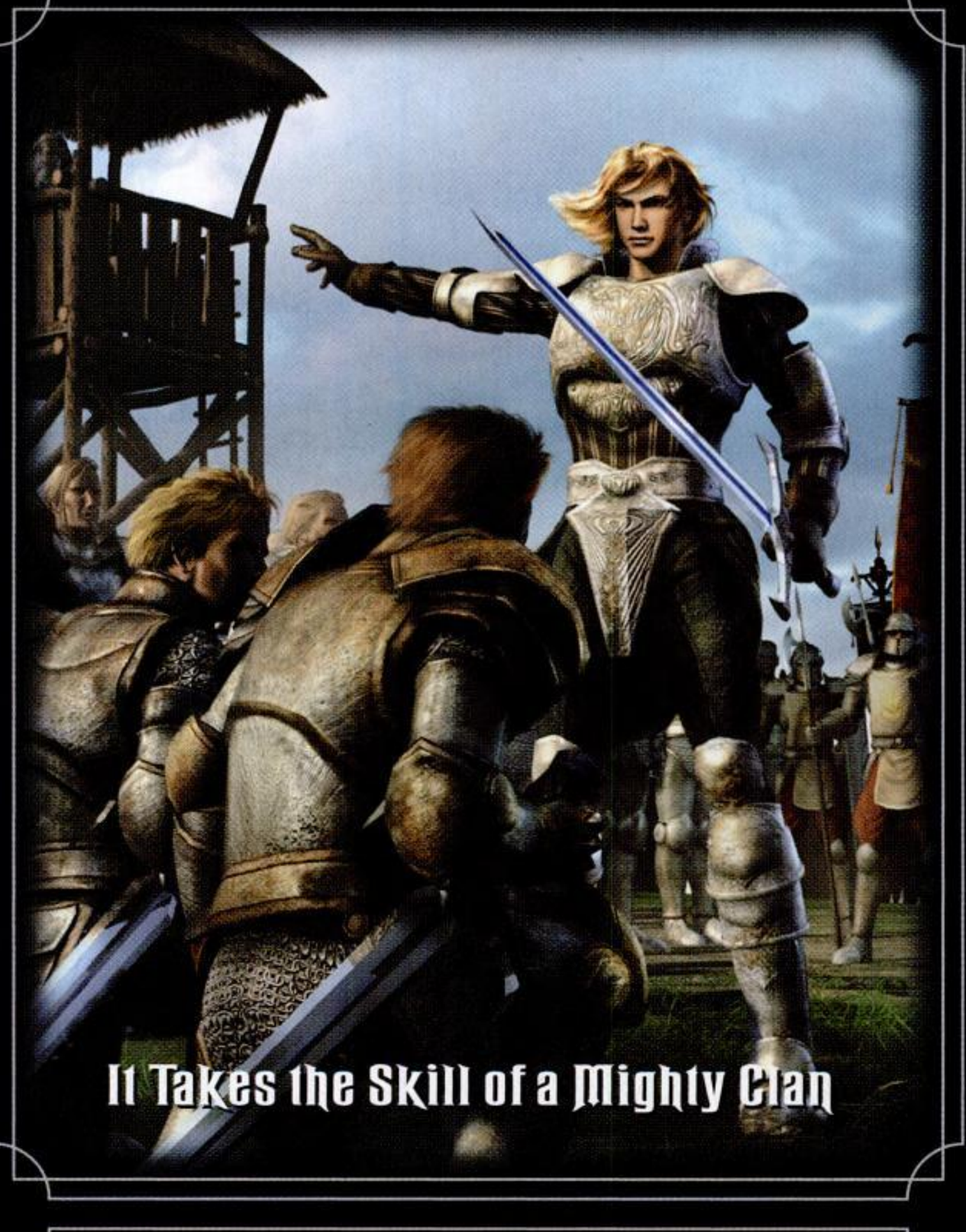
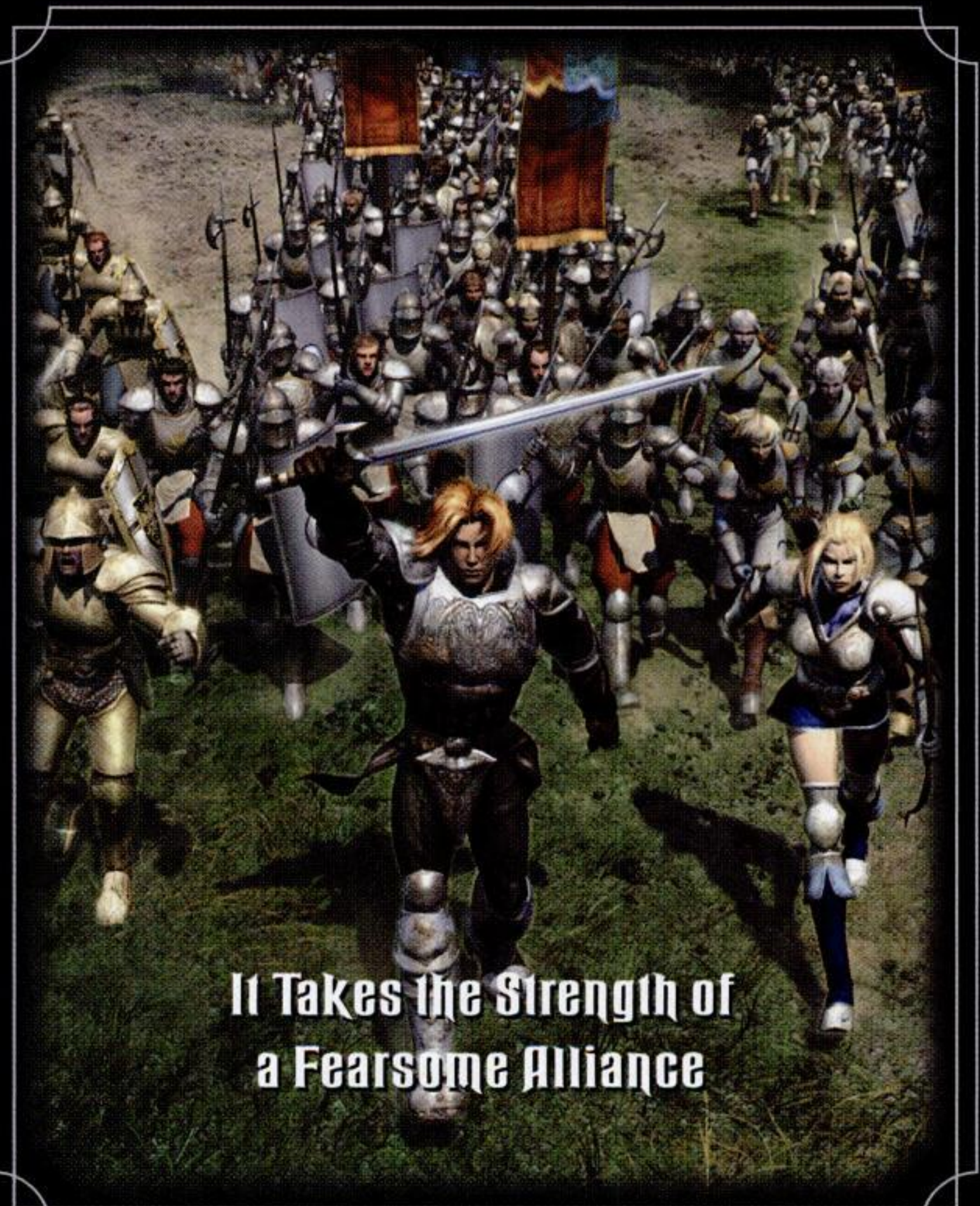
It Takes the Will of
a Single Warrior



It Takes the Skill of a Mighty Clan



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a Fearsome Alliance

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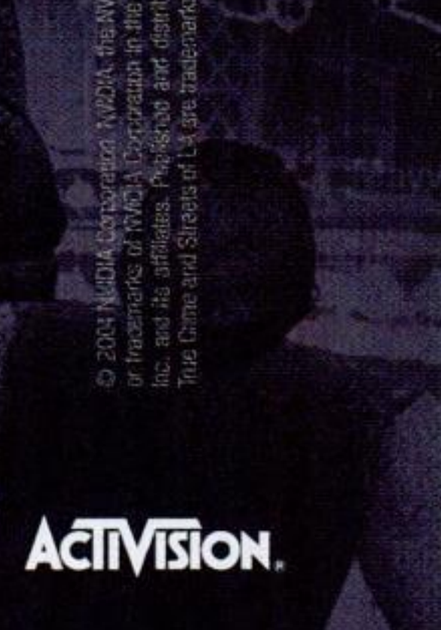

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MAXIMUM PC's 4th Annual Geek Quiz

Are you a bit-kicking alpha geek who dreams of floating code in your sleep, or just a helpless sniveling PC poseur? It's time to find out exactly where you stand in the geek heirarchy

Last year's Geek Quiz provoked hysterical pleas for mercy. "It's too difficult!" some whined. "I should have scored higher!" others bleated. The editors discussed the issue and arrived at a consensus.

Tough.

Technology isn't for the weak or faint-hearted. It evolves at a rate that would have made Darwin's head spin. A single lapse in judgment when you're selecting components for a new rig could cripple the entire system and leave you with little more than the processing equivalent of a GameBoy Advance. Needless to say, the more you know about hardware, software, and PC technology, the easier it will be to make it all work for you.

We couldn't put it any better than Donald Rumsfeld, who said "there are also unknown unknowns—the ones we don't know we don't know." These timeless words remind us of why *Maximum PC* constructs a grueling technology quiz every year. Our goal is to help you find the gaps in your understanding of technology so the "unknown unknowns" become known, and you can know you know them.

There are four stages to this year's quiz; if you can answer 90 percent of the questions correctly in each stage, you've earned a badge of geek honor. And by the end of the quiz, you'll know exactly where you stand among your propeller-head peers.

That's a good thing to know you know. Good luck!

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Geek Quiz

STAGE 1: If you can answer nine of the following 10 questions correctly, you're safely elevated above the tragic label of the Geekus Ignoramus

1) Which is not true about flash memory?
- **A** It retains data without external power
- **B** It has a limited number of write/rewrite cycles
- **C** It cannot be reformatted
- **D** It's used in cameras, MP3 players, and PDAs

2) How many pixels are there on a flat-panel display with a native resolution of 1280x1024?
- **A** 728,110
- **B** 1,310,720
- **C** 1,920,000
- **D** 2,560,000

3) Complete this series: QWE, ASD, ...
- **A** ZXC
- **B** QAZ
- **C** WSX
- **D** EDC

4) LCDs have never been described with the term:
- **A** Active matrix
- **B** Dual scan
- **C** Thin film transistor
- **D** Local antialiasing

5) More people are killed in Africa by _____ than by lions every year.
- **A** Hyenas
- **B** Rhinoceroses
- **C** Tigers
- **D** Hippopotamuses

6) Apple's iTunes music shop uses which audio compression scheme?
- **A** AAC
- **B** OGG
- **C** WMA
- **D** MP3

7) BIOS stands for:
- **A** Basic input/output system
- **B** Basic input/output summary
- **C** B-level input/output system
- **D** Batch input/output summary

8) The information you get from RSS is usually called a:
- **A** Push
- **B** Summary file
- **C** Plan file
- **D** Feed

9) Which term isn't associated with wireless connectivity?
- **A** 802.11g
- **B** IR
- **C** HomePlug
- **D** Bluetooth

10) What's the code-name for Microsoft's next-gen operating system?
- **A** Longhorn
- **B** Bullhorn
- **C** Foghorn
- **D** Leghorn

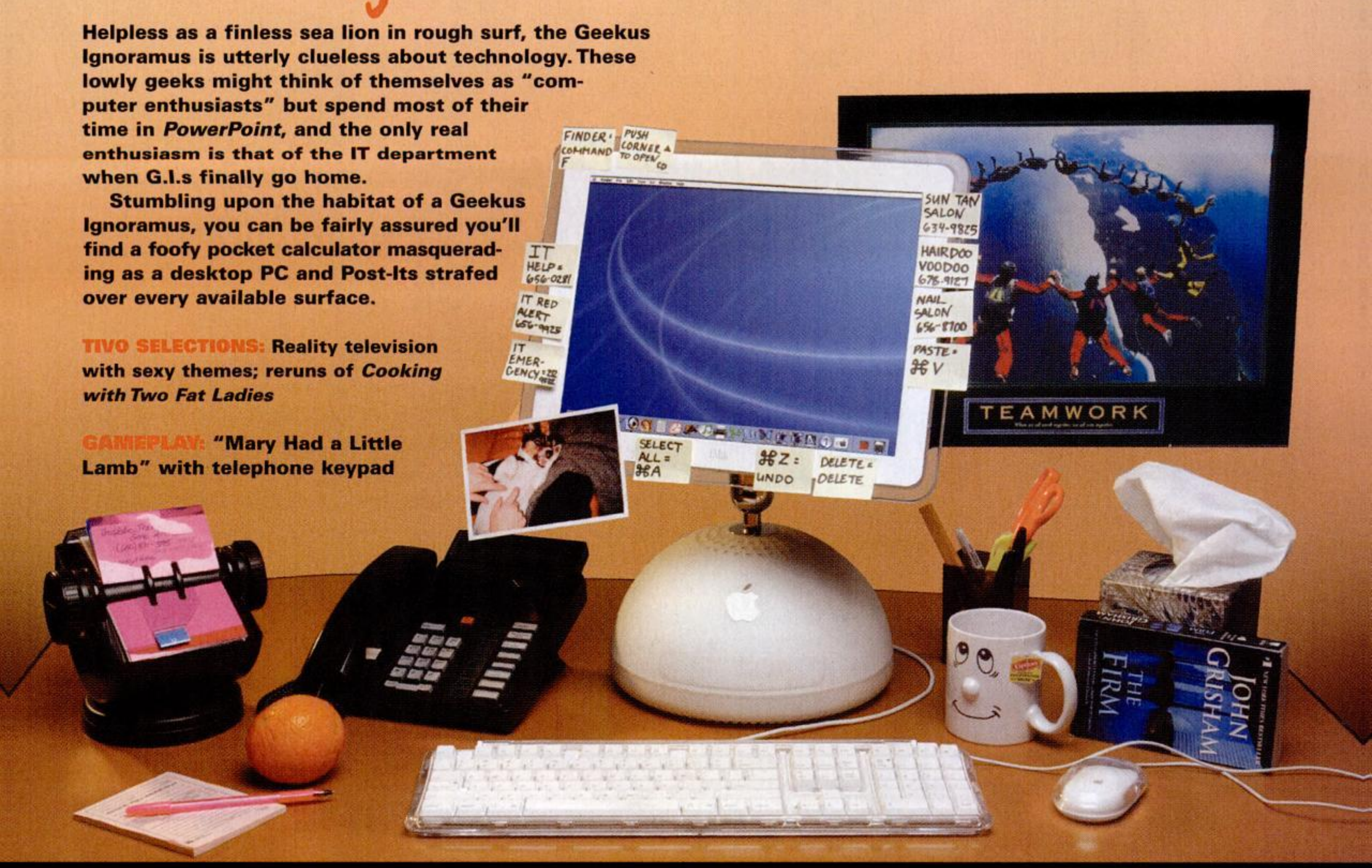
Geekus Ignoramus

Helpless as a finless sea lion in rough surf, the Geekus Ignoramus is utterly clueless about technology. These lowly geeks might think of themselves as "computer enthusiasts" but spend most of their time in *PowerPoint*, and the only real enthusiasm is that of the IT department when G.I.s finally go home.

Stumbling upon the habitat of a Geekus Ignoramus, you can be fairly assured you'll find a foofy pocket calculator masquerading as a desktop PC and Post-Its strafed over every available surface.

TIVO SELECTIONS: Reality television with sexy themes; reruns of *Cooking with Two Fat Ladies*

GAMEPLAY: "Mary Had a Little Lamb" with telephone keypad



ANSWERS 1=C, 2=B, 3=A, 4=D, 5=D, 6=A, 7=A, 8=D, 9=C, 10=A

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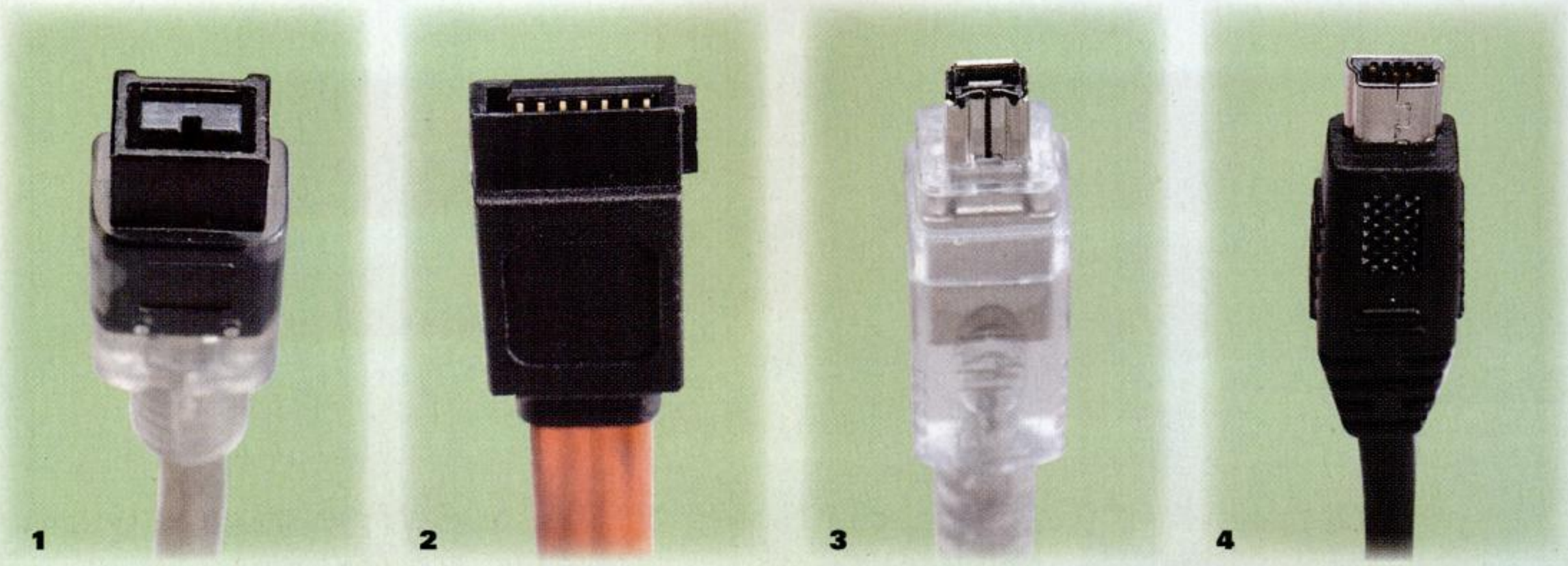
Geek Quiz

STAGE 2: If you can answer 18 of the following 20 questions correctly, reward yourself with a new videocard for your graduation from the family of Geekus Primitivus



1) Match the connectors with their photos:

A Serial ATA
B IEEE 1394a
C IEEE 1394b
D Mini-USB

2) What radio frequency do 802.11g wireless networks use?

A 802.11MHz
B 900MHz
C 1.9MHz
D 2.54GHz

3) Who makes the graphics accelerator in the Xbox?

A ATI
B Trident
C Intel
D nVidia

4) What is the data rate of a 2x DVD?

A 300 KB/s
B 1.32 MB/s
C 2.46 MB/s
D 5.28 MB/s

5) Match the acronym with the resolution it represents:

A	XGA	**1**	640x480
B	UXGA	**2**	800x600
C	SVGA	**3**	1024x768
D	VGA	**4**	1600x1200

6) A soundcard with a 24-bit DSP and 16-bit codecs can only:

A Output at 16-bit
B Give you 40-bit audio when both channels are combined
C Give you 24-bit audio, but only through the optical port
D Internally sample audio at 32-bit resolution

7) Intel announced in 2003 that it had shipped more than _____ CPUs.

A 500 million
B 1 billion
C 3 billion
D 5 billion

8) HDMI is a:

A Cable type for connecting high-definition video components
B Shader language for game development
C Digital rights management proposal
D Term we just made up that has nothing to do with PCs

9) Which connection type has the most bandwidth?

A PCI
B AGP 4x
C Serial ATA
D High-Speed USB

10) Which is not a type of battery formulation?

A Lithium-polymer
B Nickel metal-hydride
C Ferric calcium-oxide
D Lithium-ion

11) The one part of a hard drive which must never, ever be covered up is the:

A Power connector
B Data connector
C Breath hole
D Platter zone

12) A passive cooling rig won't have:

A Heat pipes
B Moving parts
C Heatsinks
D A videocard

13) What is steganography?

A Using quantum mechanics to transmit encrypted messages with photons
B Using "recursive" encryption, or multiple layers of encryption on a single message
C Hiding a secret message within another message or file
D The fancy term for a "rebus"

14) BTX is an acronym for:

A Breakthrough technology extension
B Bullet time extreme
C Balanced technology extended
D Balanced technical extensions

15) Commercial DVD Video discs are usually:

A Dual layer
B Double sided
C Dual format
D Double density

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16) In 2003, a lawsuit erupted between hard drive manufacturers and consumers over:

- **A** Slow performance
- **B** The definition of a byte
- **C** Excessively loud noise
- **D** A print advertisement that used the slogan "Byte Me"

17) Which extension will you not find in a DVD Video disc?

- **A** MPG
- **B** IFO
- **C** VOB
- **D** BUP

18) What belongs between your CPU and heatsink?

- **A** Thermal paste
- **B** Dark matter
- **C** Conductive disc
- **D** Copper plating

19) What does MAME do?

- **A** It's a script-kiddie weapon for developing Trojans
- **B** Lets you play old arcade games on your PC
- **C** Manages Windows Services running in the background
- **D** It's a dongle-based PC lockdown device

20) BitTorrent is:

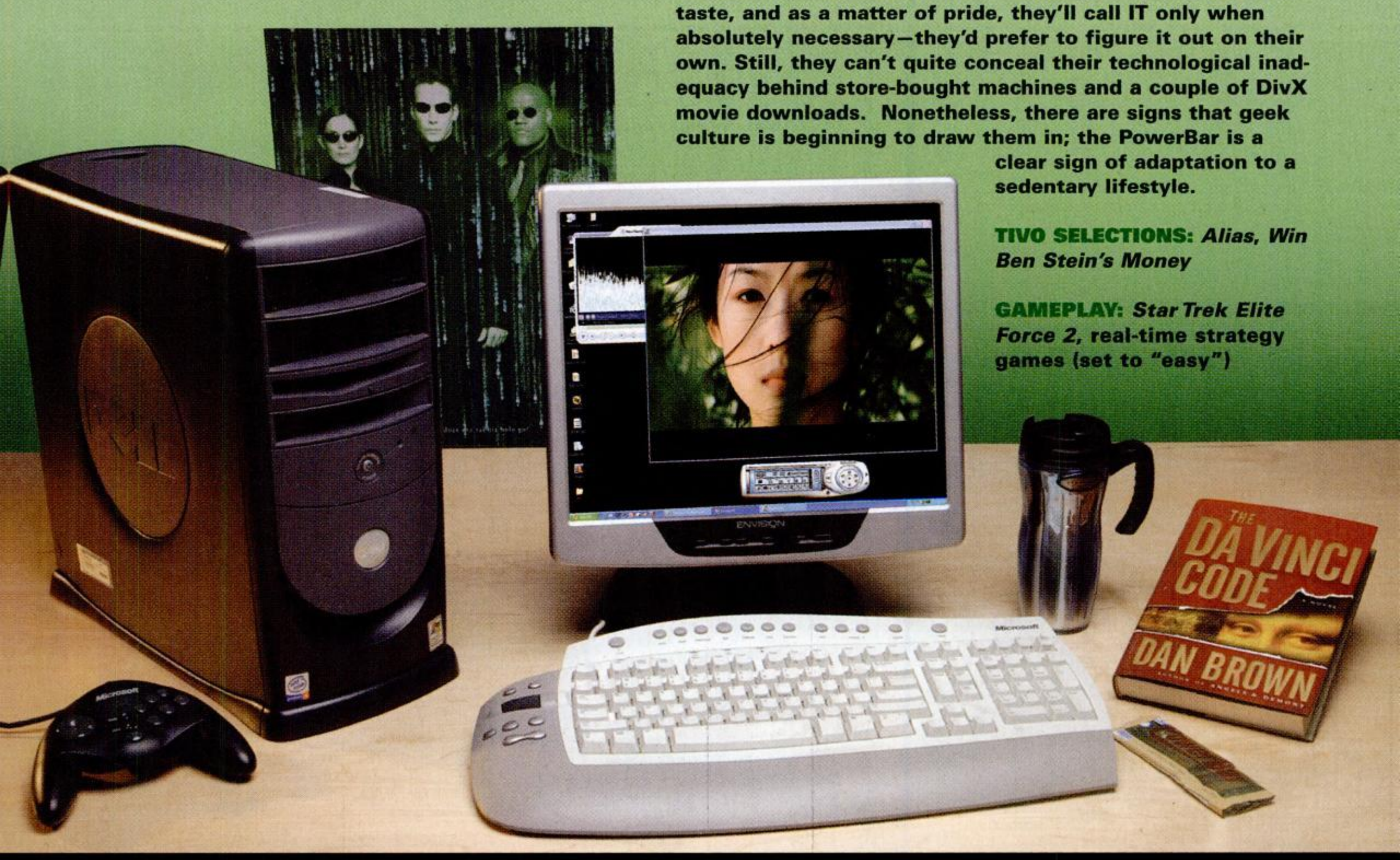
- **A** An encryption standard
- **B** A peer-to-peer protocol
- **C** A type of hacker assault
- **D** An alternative GUI for Linux

Geekus Primitivus

The Geekus Primitivus is starting to get it. But just barely. Geekus Primitivuses are discriminating. They've got a little taste, and as a matter of pride, they'll call IT only when absolutely necessary—they'd prefer to figure it out on their own. Still, they can't quite conceal their technological inadequacy behind store-bought machines and a couple of DivX movie downloads. Nonetheless, there are signs that geek culture is beginning to draw them in; the PowerBar is a clear sign of adaptation to a sedentary lifestyle.

TIVO SELECTIONS: ***Alias, Win Ben Stein's Money***

GAMEPLAY: ***Star Trek Elite Force 2,*** **real-time strategy games (set to "easy")**



ANSWERS 1= A2 B3 C1 D4, 2=D, 3=D, 4=C, 5=A3 B4 C2 D1, 6=A, 7=B, 8=A, 9=B, 10=C, 11=C, 12=B, 13=C, 14=C, 15=A, 16=B, 17=A, 18=A, 19=B, 20=B

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Geek Quiz

STAGE 3: If you can answer nine of the following 10 questions correctly, consider yourself better than the mere Geekus Erectus

1) The latest ATA command set is dubbed:
- **A** ATA/5
- **B** ATA/6
- **C** ATA/7
- **D** ATA/8

2) RAID 0 is not technically RAID because it lacks:
- **A** Four drives per array
- **B** Error-checking data
- **C** Redundancy
- **D** CRC checks

3) Which is not a video compression standard?
- **A** DivX
- **B** Xvid
- **C** H.264
- **D** AVI

4) Intel's EFI stands for:
- **A** Extensible firmware interface
- **B** Extensible firmware interrupt
- **C** Extendible firmware interface
- **D** Extendible firmware interconnect

5) A speaker system's RMS rating conveys that system's:
- **A** Sustained power output
- **B** Number of watts per channel
- **C** Ohms of resistance
- **D** Wattage it can produce before damage occurs

6) Which number is closest to the capacity of a standard DVD-9 DVD Video disc?
- **A** 4.7GB
- **B** 8.5GB
- **C** 9.4GB
- **D** 12.32GB

7) Public key cryptography is also known as:
- **A** Symmetric key cryptography
- **B** Concentric key cryptography
- **C** Eccentric key cryptography
- **D** Asymmetric key cryptography

8) The term "giant magnetoresistive" refers to a hard drive's:
- **A** Read head
- **B** Media
- **C** Capacity
- **D** Substrate

9) How many wires carry the signal in an Ethernet cable?
- **A** Three pairs
- **B** Four wires
- **C** Two wires
- **D** Four pairs

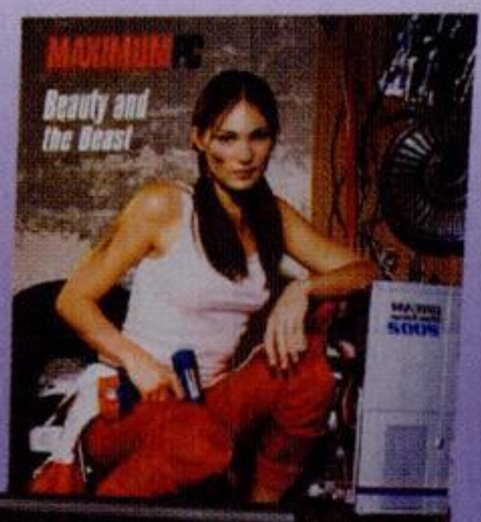
10) Why is it important to have more bandwidth between the north bridge and south bridge chips?
- **A** To help feed I/O intensive devices plugged into the south bridge
- **B** To reduce the latency of network traffic across the memory bus
- **C** To remove the performance bottleneck for optical drives
- **D** To support next-generation, low latency applications such as Voice Over IP

Geekus Erectus

Geekus Erectuses don't call IT—they *are* IT. Note how the diet has completely devolved into energy beverages and protein pellets delivered in the simplest forms possible. G.E.s acquire games and flight simulators faster than they can play them; the game packaging eventually stacks along the wall until it resembles a makeshift blast shield. Erectuses can often be found dabbling in the black art of case modding and overclocking on holidays when the rest of the office is away.

TIVO SELECTIONS: ***Babylon 5*** **(will not erase episodes of the discontinued series),** ***SpongeBob Squarepants***

GAMEPLAY: ***Everquest*** **(with the occasional all-nighter); replays** ***Deus Ex***



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Geek Quiz

STAGE 4: If you can answer 18 of these 20 questions correctly, you don't need us—we need you

1) The blue-violet lasers in Blu-Ray DVD recorders operate at what wavelength?

A 305nm
B 350nm
C 405nm
D 650nm

2) Which CPU does not have an on-die memory controller?

A Transmeta Crusoe
B AMD Athlon XP 3200+
C AMD Opteron
D AMD Athlon 64 3200+

3) What is the name of the DirectX 9 programmable shader language?

A HLSL: high-level shading language
B HLSL: high-load shading language
C TLSL: top-level shading language
D TLSL: top-load shading language

4) What will Intel do with the CSA port in its next-generation chipsets?

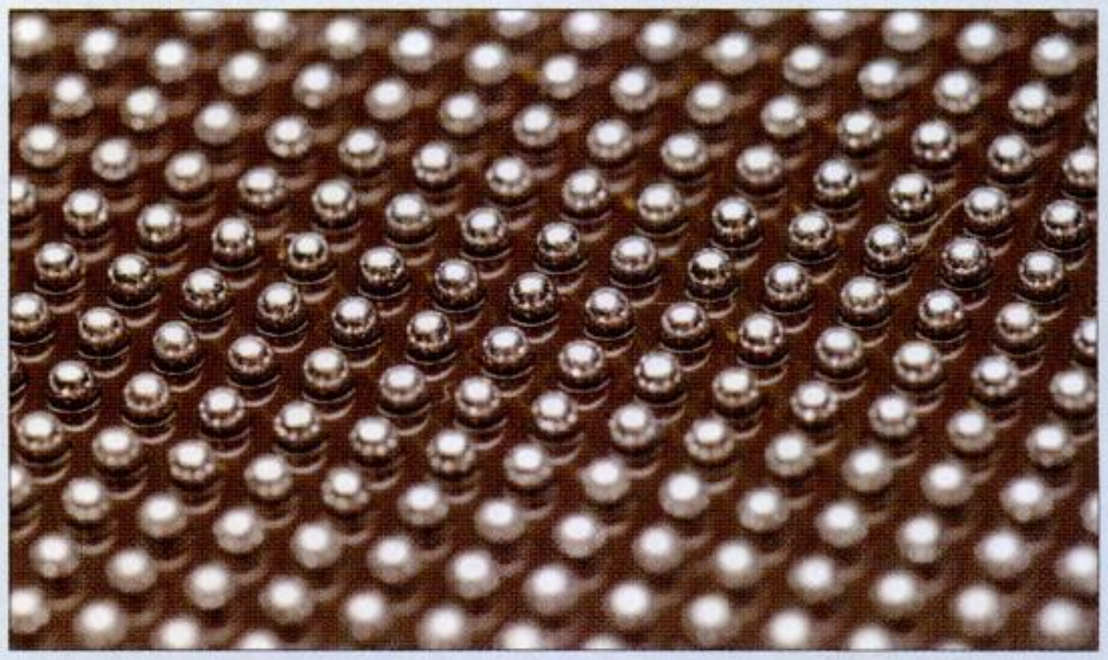
A Move to DSA, or dynamic streaming architecture, to support full duplex Gigabit Ethernet
B Add jumbo frames support and a new PHY
C Move it directly into the die of Dothan-class mobile processors for better power management
D Dump it because there's enough bandwidth available in the Grantsdale and Alderwood chipsets to support GiG-E on the down low

5) PC3200 is the equivalent of:

A DDR200
B DDR266
C DDR333
D DDR400

6) What do you suppose this is?

A Multicontact interconnect
B Ball-grid array
C Ball-bearing grid
D Fluid dynamic bearing



7) IBM's ATA command queuing technology from its 180GXP drive is called:

A Mark and Retrieve
B Tag and Seek
C Localize Marker System
D Optimized Server Metrics

8) What does the "Matrix" in Intel's new Alderwood and Grantsdale chipset refer to?

A A RAID mode that mixes both RAID 0 and RAID 1 on the same two drives
B A more efficient way to flush the Bussard data queue scoops
C A marketing deal Intel has signed with the Wachowski brothers for the next Matrix movie
D A faster way to synchronize data between high-speed PCI Express ports and the memory controller

9) Which company does not have a license to make Pentium 4 core logic chipsets?

A nVidia
B ATI
C SIS
D VIA

10) What's a Gibibyte?

A 10242 bytes
B 1,099,511,627,776 bytes
C 1,000,000,000 bytes
D 1,073,741,824 bytes

11) ExpressCards for laptops will be available in what formfactors?

A Single-wide and double-wide
B Single-channel and dual-channel
C Standard and "Max"
D Thinband and wideband

12) How much L2 cache does an Athlon 64 3000+ have?

A 128KB
B 256KB
C 512KB
D 1MB

13) How many pipeline stages does a 3.4GHz "E" Pentium 4 have?

A 31
B 20
C 24
D 12

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14) Which core logic chipset does not support dual-channel memory?

A Intel 815
B Intel 840
C Intel 865G
D VIA PT880

15) What technique is used to render *Doom 3's* shadows?

A Shadow volumes
B Transparency boundaries
C Drop differentials
D Alpha channels

16) What color is most often the ground wire in a power connector?

A Blue
B Red
C Green
D Black

17) What Intel CPU will first get AMD's 64-bit extensions?

A Pentium 4
B Xeon
C Centrino
D i960

18) What is the correct term for the architecture in Intel's Pentium 4-series of CPUs?

A P6
B P7
C NetBurst
D HyperThreading

19) What socket doesn't support AMD CPUs?

A Socket 940
B Socket 939
C Socket 754
D Socket 604

20) The psychoacoustic phenomenon that tricks your ears into thinking bass notes are deeper than they actually are is called:

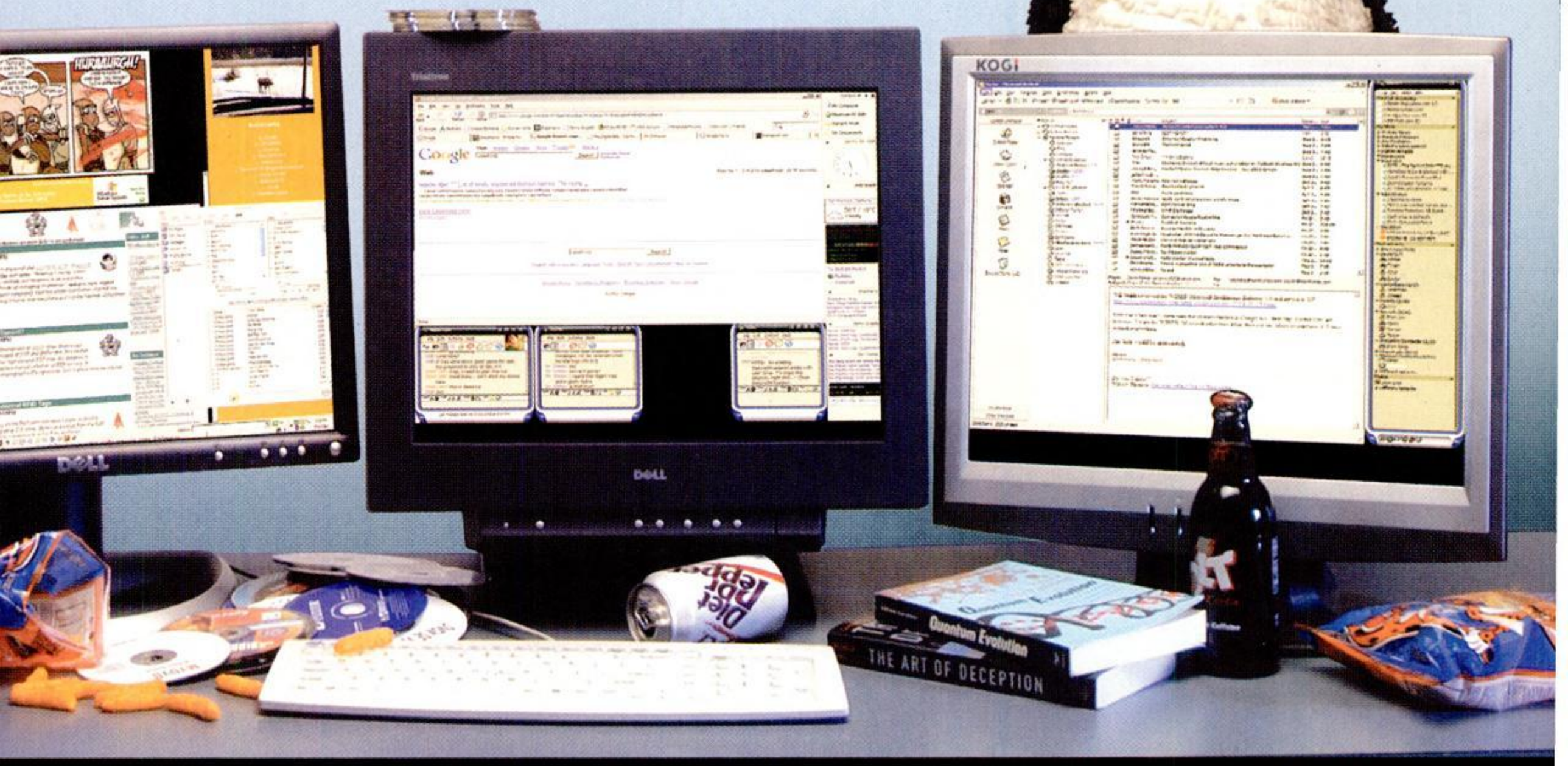
A The missing fundamental
B Sub-level acoustic fields
C Renfrow sonic elements
D Bipolar sonar reversal

Geekus Peakus

Geekus Peakuses have completely unhinged themselves from society at large. They never call IT because they don't have jobs; instead, you'll find them doing a little freelance PERL scripting here, a little XML massaging there. Their bodies have not only adapted to xanthum gum, partially hydrogenated oils, and FD&C Red#4—they *require* it. Their preferred names are acronyms (Phillip Ulyssis Grant would prefer to be known as "Pug"). And they don't seem to mind if no one laughs at a joke about the chick in Accounting with the FAT32 ass.

TIVO SELECTIONS: Manga and Anime from cable (that's nonetheless criticized for not being as good as the "real Japanese stuff").

GAMEPLAY: PC RPGs (while quietly holding a torch for the pencil-and-paper D&D of yore). ■



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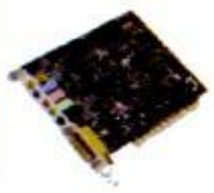

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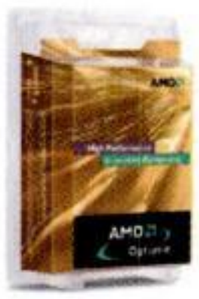

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AMD Opteron™ Model 244
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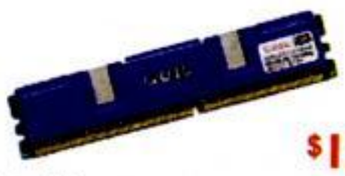

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Watts Up?

FAN: Heatsinks alone are not enough. The fan sucks air from the PC case and exhausts it out the back to prevent your power supply from becoming an EZ Bake oven.

LINE-CONDITIONING CIRCUITRY: This is another of the phalanx of components within your power supply that help maintain consistent power levels from notoriously unreliable home sockets. Generally found only in top-tier power supplies.

ELECTRO MAGNETIC INTERFERENCE (EMI) FILTER: Found in high-end power supply units, EMI circuitry smoothes out the small fluctuations in the incoming AC current.

INPUT CAPACITOR: Usually the largest capacitor in a PSU, this provides reserve power when input power suddenly plummets (like, for example, when someone fires up the blow-dryer). In general, the bigger the capacitor, the better.

The Shocking Truth about Power Supplies

The foundation of a stable and long-lasting system is a high-quality power supply. But choosing the right one is anything but a straightforward process. We're here to help by answering all your PSU questions: how much power you really need, how to decipher cryptic labels, and how to sort the good from the bad

OUTPUT CAPACITORS (beneath heatsink): Essential for system stability, these provide the PSU with the excess muscle needed when the electrical demands of your PC's components suddenly changes, such as when two optical drives spin up simultaneously.

HEATSINKS: Transistor switches and power diodes in the PSU produce loads of heat. The heatsink helps whisk away the heat from these components, a vital task considering a power supply becomes less efficient as its temperature rises.

POWER FACTOR CORRECTION CIRCUIT (beneath PCB): Computers, like many other electrical appliances, draw a lot more power at the instant they're turned on—as much as four times the amount drawn under regular use. While this spike in power demand lasts just a fraction of a second, it may be enough to trip a circuit breaker in a home or office that's running numerous electrical appliances. The duty of the power factor correction circuit is to smooth out this initial spike as much as possible, reducing its amplitude and preventing circuit overloads.

Frenetic CPUs and flashy videocards dominate the headlines, but the humble power supply unit (PSU) has gone largely ignored. It's sad, but understandable. After all, it's an insipid little box that makes for a poor conversation piece even among geeks. The fact that even the brawniest PSU won't yield an extra ounce of computing prowess certainly doesn't help.

Shamefully, some system vendors slyly exploit consumers' general lack of interest in and understanding of PSUs by installing cheap, barely adequate power supplies in their systems. That's where we come in. We're here to set the record straight about the most underrated PC component of all time.

At a fundamental level, the PSU is a collection of electrical components that converts 120V AC power from your wall socket into 12V, 5V, and 3.3V power that your computer uses. If you've got a crappy power supply, the side effects may take a while to manifest, but manifest they will. They'll appear in the form of system crashes, spontaneous reboots or shutdowns, and even component damage over time. Whether you're buying a PC off the rack, building one from scratch, or simply upgrading, settle for nothing less than a quality power supply—the PSU is not the place to pinch pennies.

Sorting out the quality power supplies from the junky ones is no simple task. You can't even look inside the damn thing (unless you want to risk electrical shock—even if the power supply is unplugged). Don't sweat it. We're going to show you what's inside the box, how to interpret the strange glyphs on the label, and how to know which PSU is right for your rig.

—DWIGHT LOOI

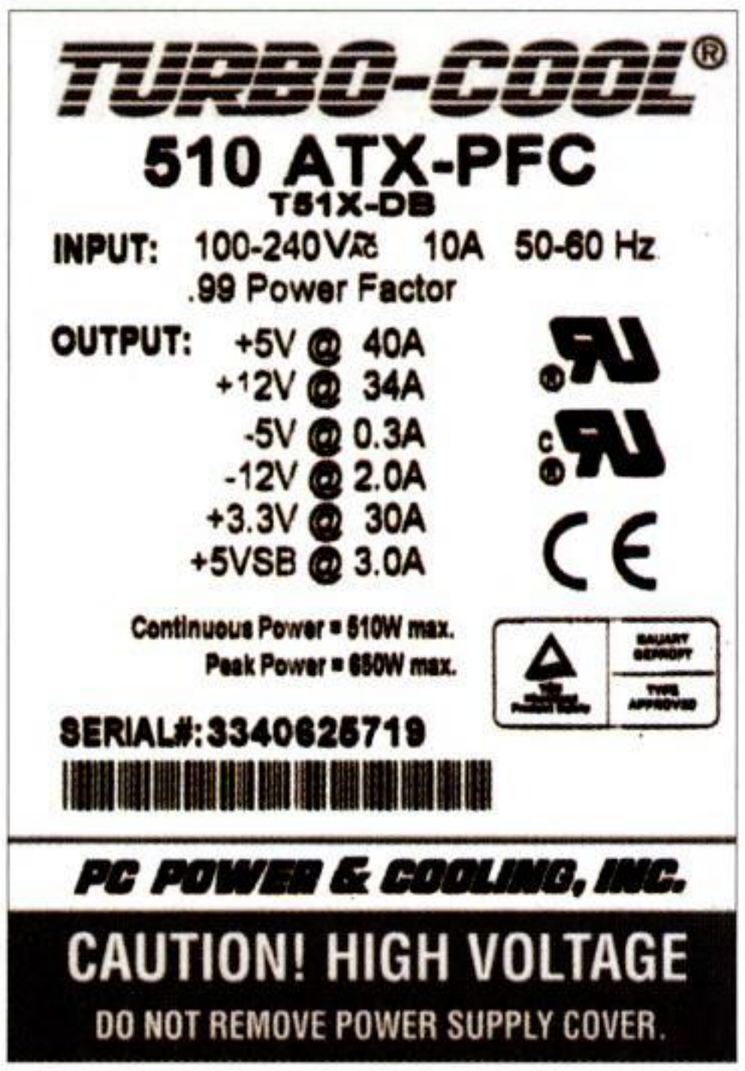
The Power Supply Demystified

13 important questions about your PC's most veiled component

What terms should I know before purchasing a power supply?

There are three technical terms used in describing electricity that you should understand: voltage, current, and power. Voltage, expressed in volts (V), is the potential difference of electrical energy between two points. In simpler terms, it's electrical pressure. Current, expressed in amperes (A), is the rate of flow of electrons (one ampere of electrical current is the flow of roughly $6.24x10^{18}$ electrons a second—you'll find out why this scary number is important in a moment). Power is simply voltage multiplied by current, and is expressed in watts (W).

Here's a classic metaphor for how voltage, current, and power are interrelated.



Quality power supplies will state the current load that each output line can handle.

If you picture electricity as water in a garden hose, voltage is akin to the pressure in the hose and current is the rate of water flowing through it. A watt of power is the ability to move $6.24x10^{18}$—there's that number again!—electrons a second at one volt.

What should I look for on a label when I buy a power supply?

All power supplies have a power rating expressed in watts (W). This is a measurement of the maximum electrical power the unit can deliver. In general, a high power rating is preferable, and a PC built of contemporary parts should use a PSU of at least 350W.

The label on a power supply unit will also state the input voltage. For the US market, this should be 120V AC at 50/60Hz, although many units will be capable of switching between 120V and 240V AC (either automatically or via a manual switch). *If you plan to take your system abroad, be sure to get a unit that offers this universal voltage support.*

Other than the power and input voltage specifications, many PSU labels will state the maximum current load supported by each of the individual output lines—the connectors hanging from the PSU like dreadlocks that you connect to each of your PC's components. To arrive at the power rating—the maximum amount of consistently sustainable wattage—for each of the output lines, simply multiply the voltage (V) rating by the current rating (A).

For example, if a PSU's output for a 5V connector is stated as +5V @ 40A, it means the connector can maintain 200W (5x40) of consistent power (although few components are that gluttonous). In general you should only have to worry about the positive (+) voltages because this is where your components draw their power from. But even here there are degrees of precision. Intel's ATX 12V specification requires that output voltages be held to a +/-5 percent tolerance. But some manufacturers go a step further and limit their high-end units to +/-3 percent or even +/-1 percent tolerance. This is sometimes indicated on the label, and the stricter the tolerance the better.

A power consumption chart at the end of this article will help you assess the power requirements of each of your components and ensure that the projected power draw on each of the power lines does not exceed what the PSU can provide.

In what ways do manufacturers misrepresent wattage claims?

A seldom publicized fact is that the wattage rating posted for a power supply is only meaningful for a particular operating temperature. The reason is that all consumer PSUs lose efficiency as temperature increases. One of the most common ways shameless vendors cheat on their wattage claims is by testing their power supplies at a temperature far below a reasonable operating temperature. It's not unusual for such power supplies to lose 25 percent or more of their rated ability at 100° F—the heat level where they typically operate.

The problem is that there is no regulatory or conventional requirement for the power rating to be accompanied by a temperature rating. A "450W" power supply could very well be capable of 450 watts only at 40° F. The manufacturer is technically not lying, but even if you use your PC in a meat locker, the inside of your system never gets this cold. At a normal operating temperature of 100° F, this same PSU would likely be capable of just 280 watts!

A word of warning: Don't give much credence to the official-looking independent laboratory emblems and certifications on PSU boxes. Again, there are no clearly defined standards regarding the ambient or operating temperatures at which these products were tested. In addition, extremely unscrupulous vendors have been known to fraudulently tack on certification logos.

Unfortunately, there is no practical way of testing the PSU for its performance before you buy it, and that's why we have always recommended (to the irritation of some readers who think we're butt-kissing) that you stick with popular brands that have solid reputations to uphold and excellent-quality brands to protect, such as PC Power & Cooling, Enermax, and Antec.

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Is my 550W power supply really consuming 550W at all times?

Absolutely not!

First off, a power supply's rating refers to its *maximum* output power rating under ideal conditions. No power supply is 100 percent efficient. In fact, some are no more than 60 percent efficient—there are some 550W PSUs that actually draw around 800W to 900W in order to deliver 550W of output while allowing for the 30 to 40 percent that's lost as heat, electromagnetic radiation, etc.

Thankfully, all power supplies used in today's PCs are of the "switching" variety. Switching power supplies draw only as much current as is needed from the AC input. Therefore, when it's only required to pump 100W, the power supply is likely only consuming around 130W of power regardless of its maximum wattage rating. Feel free to get the biggest, baddest PSU you can afford. It will consume no more power than a lesser unit.

What are sag and surge protection? Do I need them?

Before answering that, let's quickly define some terms. Sag occurs when your electrical current drops. Ever turned on a microwave oven and witnessed your lights dim? That's sag. Conversely, a surge occurs when your electrical current suddenly rises. High-quality power supplies incorporate a multitude of components to compensate for the brief sags and surges in input power. In general, capacitors help guard against sags, while inductors and other components help protect against surges.

These protective components help the PSU provide your system with clean and stable power even when your local utility company feeds you the occasional hiccup. If you operate a backup uninterruptible power supply—a device that provides your system with several minutes of backup power so you can save your work in case your power goes out—your PSU's sag protection helps ensure that your system has enough juice to run on for the few milliseconds it takes the UPS to kick in. Surge protection helps prevent power spikes in the output power that could tax your PC's electronics, which could result in instability and even permanent component damage.

You could get away with using a power supply that lacks sag and surge protection regulators, and you might not even miss them. But it's a gamble—are you sure you want to roll the dice when your PC is at stake?

If I splurge on a quality power supply with sag and surge protection, do I benefit from having a redundant sag/surge protector?

Yes. It's always a good practice to also operate an external surge/sag protector. Some of these units are likely to offer much better protection against massive power spikes (such as when lightning strikes the electrical grid) than the surge protection circuitry in your PSU, which is designed to clean up modest fluctuations in power more than anything else.

Furthermore, these external units provide protection to external peripherals such as your monitor, scanner, printer, etc, which don't benefit from your PSU's built-in circuitry.

What kind of fan should I look for, or avoid, in a power supply?

One of the most common causes of PSU failure is when the fan seizes up and causes the PSU to overheat. Hence, a high-quality fan is a great insurance policy. In general, look for a power supply with a ball-bearing fan. Ball-bearing fans are more durable than traditional fans and less likely to fail or get noisy over time. They also cost significantly more than their conventional siblings, so if a manufacturer includes one in its power supply you can be sure it will be noted on the label, packaging, and/or documentation. Most new PSUs will also sport a connector that allows the mobo to control the PSU fan using the mobo's temperature sensors.

Is it true you can tell a PSU's value by how heavy it feels?

Yes, as a general rule, the heavier power supplies tend to be better—remember this when evaluating units from lesser-known manufacturers. As for the PSU's innards, bigger is definitely better—beefy capacitors and heatsinks usually distinguish the serious power players from the poseurs. These items are also notoriously weighty. So, suffice it to say, if a PSU is feather-light compared with other units of a similar rating, chances are it belongs in the trash rather than your computer.

What are adjustable voltage potentiometers? Are they important?

A common misconception is that every power supply outputs exactly 12V, 5V, and 3.3V to each component as needed. The truth is that they do not. Most merely deliver close to these specified voltages with the deviation hopefully falling inside the allowed tolerance of the ATX specification. Sometimes the variation is caused by less-than-spot-on tolerances of the PSU's internal components, while at other times it's due to the power source. Regardless of the cause, these minor variations may be acceptable to motherboard and chipset manufacturers, but they're far from ideal in the eyes of a hardware fanatic. Some PSUs are outfitted with adjustable voltage potentiometers, which allow a user to fine-tune output across a small range of voltages.

Also known as voltage pots, these devices are not necessary, or even useful, to the average PC user. However, serious overclockers may find them useful for improving system stability, and a valuable asset when they're trying to wring every last MHz from an overclocked rig.

Do different power supplies offer different levels of CPU and mobo support? How so?

Yes, there is more than one type of power supply, and you must use only the type of power supply that complies with your motherboard's formfactor.

The ATX formfactor has been the prevailing standard for the past 10 years. With the exception of mini-PCs and slimline systems, just about every consumer PC uses an ATX power supply. It features a 20-pin connector for the mobo. However, recent leaps in power requirements by the leading CPUs have led Intel to update the ATX standard to something called ATX 12V. Dimensionally identical to the standard ATX, 12V's most notable change is the addition of a four-pin 12V connector for the motherboard. Newer Intel and AMD mobos require this connector to function. An ATX 12V PSU can be used on an older machine, but not the other way around.

Many current server and workstation motherboards, on the other hand, require an EPS 12V power supply. These have a 24-pin main connector and 8-pin 12V connector for the mobo. This is very similar to an older PSU standard known as WTX, but the pin assignments for EPS

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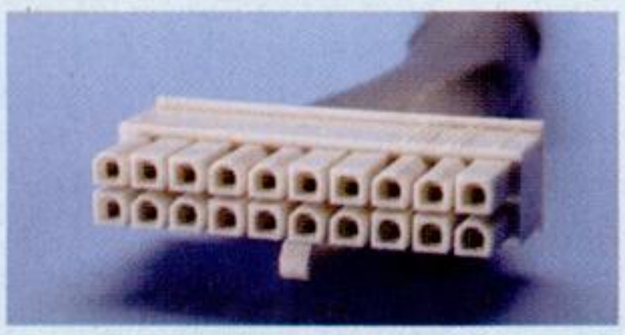
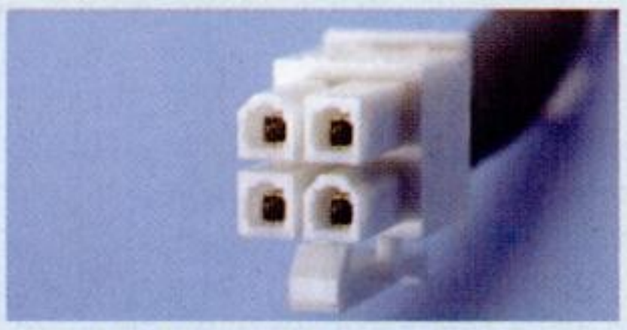
Conjunction Junction

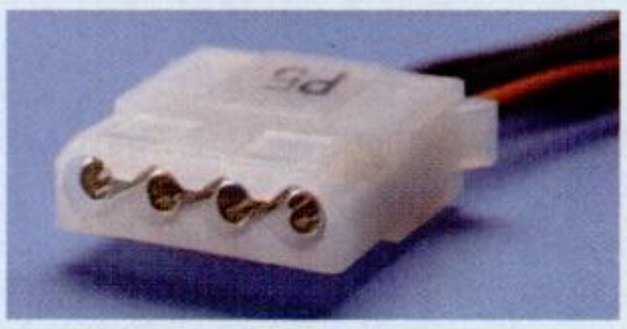
There are five main connectors you'll find on the latest power supplies. Here's a power connector peepshow to help you identify them.



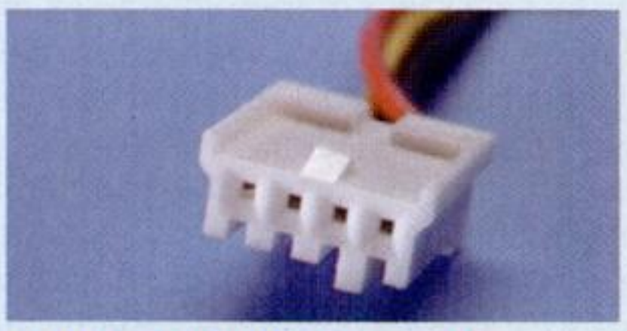
ATX MAIN POWER CONNECTOR
USED FOR: main motherboard power



ATX 12V POWER CONNECTOR
USED FOR: Additional CPU power



PERIPHERAL (MOLEX) POWER CONNECTOR
USED FOR: Hard drives, optical drives, some PCI and AGP cards



FLOPPY POWER CONNECTOR
USED FOR: Floppy drives, some PCI and AGP cards, fans

SERIAL ATA POWER CONNECTOR
USED FOR: Serial ATA peripherals (hard drives and optical drives)

12V are entirely different. Some EPS 12V PSUs also offer an additional 6-pin SSI connector for use by mobos with an AGP Pro110 slot.

In the upcoming years, the ATX formfactor will be gradually supplanted by the BTX formfactor. BTX, or Balanced Technology eXtended, specifies component placement in a three dimensional space rather than a two dimensional space, and pays special attention to heat management and airflow. With this in mind, the CPU will be moved to the front of the case, closer to the intake fan, and the expansion slots will change sides.

We'll probably start seeing viable BTX motherboards carrying Intel's new LGA775 CPU socket sometime this year. The rise of BTX may eventually bring an end to ATX's decade-long reign, but as of today, BTX is barely peeking over the horizon. It's not yet clear whether ATX power supplies will be compatible with this new spec.

How important is a warranty for a power supply?

To be honest, most of us can't live a day without our PCs. It would be unbearable to be "unplugged" for a week or more while waiting for a warranty repair/replacement to make its way through the postal system. Having said that, a good warranty isn't just a ticket to a replacement unit should the PSU fail, it's also an indication of the confidence a manufacturer has in its product. With established brands, a long warranty can be as much a testament to the product's quality as it is a promise to service it.

How long should a quality power supply last? What are the early signs of PSU failure?

A good PSU should render years of trouble-free service. Most well-built units will last a good three to five years, and will likely still be in good health even after your system has become obsolete. But with this said, if you're overhauling your system, you should probably think about a new power supply. You don't want your new PC to be eventually poisoned by an aged, failing PSU.

Typically, the first indication of trouble is abnormal sounds coming from the cooling fan. This is usually a precursor to the fan completely giving up the ghost, and it's frequently possible to replace the fan before that happens. Most PSUs use 80mm fans and they should be replaced at the first indication of anomalous operation or uncharacteristic sounds.

A fading PSU may create all manner of crashes, random shutdowns, and intermittent refusal to power up. This is often the result of the output voltage falling out of specification. However, all too often, the first indication you'll get from a failed power supply is a burning smell and a whiff of smoke, followed by a blank screen and an eerie silence.

We can't say it strongly enough: If you suspect that your PSU is ailing, deal with it now, or face much more severe consequences in the future.

What is Advanced Power Management and ACPI? Is my power supply compatible with them?

Advanced Power Management, or APM, is a standard co-developed by Microsoft and Intel that allows a system to be in one of six different states pertaining to power use: On, APM Off, APM Active, APM Standby, APM Suspend, and Off. This is meant to provide users with a way to conserve power via BIOS-directed power management. While this may sound like an additional PSU function, it isn't.

The only thing APM requires of a power supply is the ability to turn power on/off via an electrical signal and the presence of a standby voltage. All ATX power supplies are required to have these features. However, for APM to function properly, the operating system, BIOS, mobo, and other peripherals need to be APM-compliant. If some components are not APM-compliant, you may get errors or freezes when your system goes into standby mode or hibernates.

ACPI, or Advanced Control and Power Interface, is a newer and more capable power management scheme developed by Compaq, Intel, Microsoft, Phoenix, and Toshiba. Unlike APM, this standard is OS-directed rather than BIOS controlled. All ATX power supplies are ACPI-compatible, so no worries here either.

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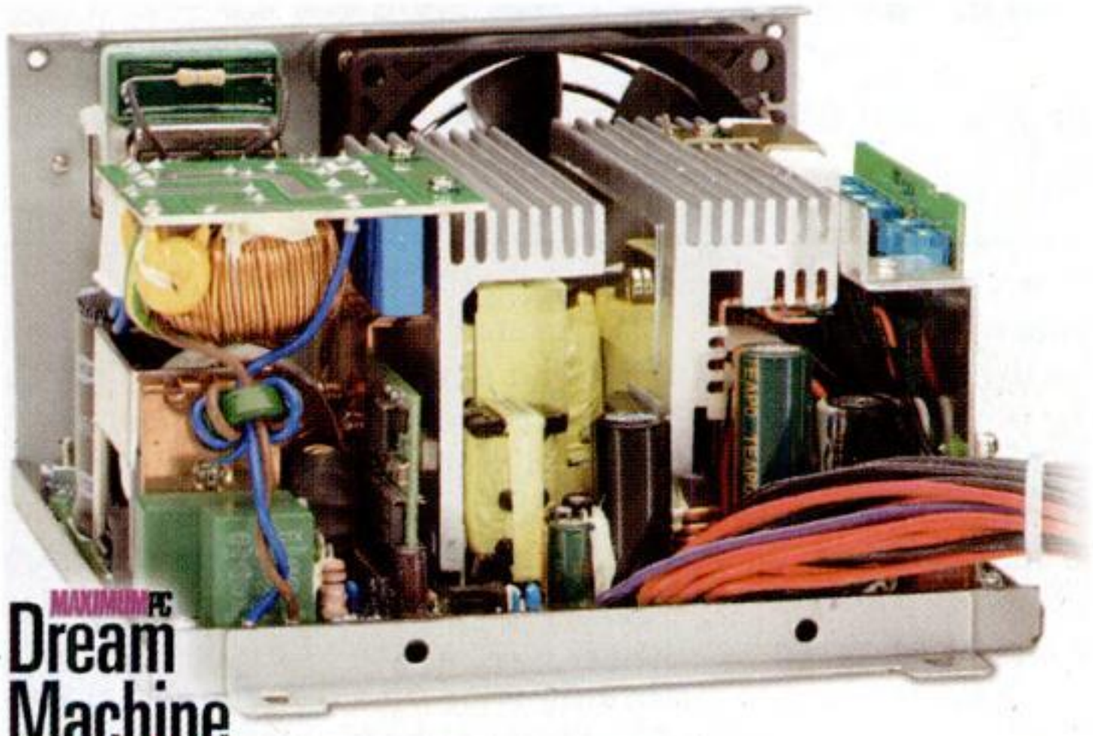
	Turbo-Cool® 510 Power Supply	So-Called "550" Power Supply	
			
Power @ 25°C:	**600W**	**550W**	Rating requires room temp. < 60°F
Power @ 40°C:	**510W**	**366W**	**True rating** (40°C is typical P.S. temp)
Power @ 50°C:	**460W**	**244W**	50°C is the spec for an industrial PC
+12V Output:	**34A***	**24A**	*38A peak. Powers CPUs and drives
Regulation:	**1%**	**5%**	**Turbo-Cool's voltages are 5X tighter**
Ripple:	**10mv**	**50mv**	**Turbo-Cool's outputs are 5X cleaner**
Max. Cooling:	**44 cfm**	**40 cfm**	Tests show "550's" 2nd fan is ineffective
Active PFC:	**Yes**	**No**	Continuous range line conditioning
Voltage Pots:	**Yes**	**No**	Adjustments for system fine tuning
Intel Listed:	**Yes**	**No**	Turbo-Cool 510 tops Intel's ATX12V list
Warranty:	**5-Years**	**1-Year**	Reliability and longevity indicator

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- **See Our Silencer® 360W-410W Dell Units!**

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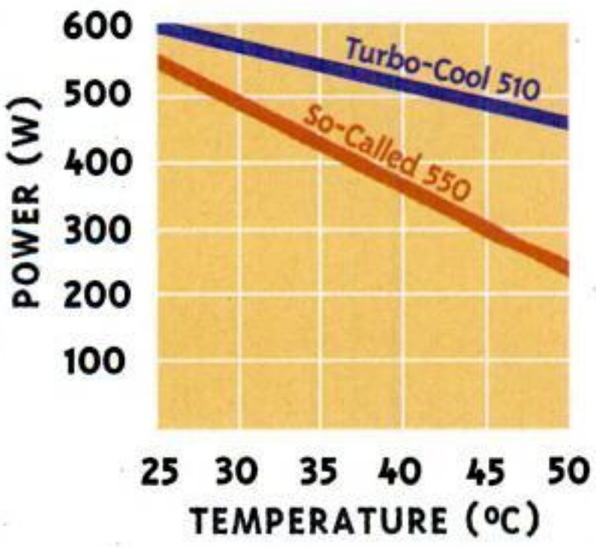

*Even though the ambient temp. in a power supply is at least 40°C (104°F), most manufacturers unrealistically assume 25°C (77°F) in order to exaggerate their wattage claims. Since the proper full-load rating is 15°C higher, these power supplies produce **33% less power than their advertised ratings** as shown on the derating chart.*

Turbo-Cool 510 derating spec: *full load @ 40°C, decrease to 90% load @ 50°C.*
So-Called 550 manufacturer's spec: *full load @ 25°C, decrease to no load @ 70°C.*

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Power Consumption Field Guide

Want to make sure your PSU generates enough power for your purposes? Put that calculator-watch to work and find out how much power you really need

The following chart is a rough reference for the power consumption of various components found in a PC.

Remember, these are broad estimates. Whenever possible you should refer to the specification sheet for each of your components; hard drives and optical drives usually have accurate figures on the drive labels themselves. Most list the current rating in amps (A) beside both 12V and 5V. For example, a 7,200rpm Seagate Barracuda 160GB hard drive has +5V 0.72A and +12V 0.35A printed on its label. Whenever you get a voltage and current spec, you may simply multiply them to get the power requirement. This means that the Seagate hard drive uses a total of 3.6 watts of +5V power (5 x .72) and 4.2 watts of +12V power (12 x .35).

For videocards, the unscientific rule is that any card with a supplemental 12V power connector (such as the ATI Radeon 9800) is likely a power hog. For such high-performance cards, it's wise to assume they need 40 to 50 watts. Assign milder videocards at least 20 watts.

As you can see, a performance PC's mobo, CPU, and graphics card hog around 150 watts of power all by themselves. Much of this comes off the +12 volt line. A typical 300 watt ATX 12V PSU is rated to supply around 180 watts of 12 volt power when working hardest. This is before we allow for heat-degradation in the PSU's ratings, for other components to also draw on the 12V output, and for any headroom for future growth. This is why we recommend you use at least a 350W PSU. In fact, we recommend you save yourself at least 30 percent of headroom between the PSU's rating and your maximum power requirement. Pay special attention to the total +12V output as many high-power components in a contemporary PC rely on this output. ■

COMPONENT	POWER REQUIREMENT	LINE(S) USED
Older CPU	20 ~ 40 watts	+3.3V
Athlon XP, Athlon 64, or P4 CPU	60 ~ 90 watts	+12V
Motherboard	20 ~ 30 watts	+3.3V, +5V, and +12V
RAM	20 watts per 256MB	+3.3V
PCI card	5 ~ 10 watts	+5V
AGP videocard	20 ~ 50 watts	+5V and/or +12V (3.3V from motherboard)
CPU case fan	2 ~ 4 watts	+12V
5,400rpm hard drive	5 ~ 10 watts	+5V and +12V
7,200rpm hard drive	5 ~ 15 watts	+5V and +12V
10,000rpm hard drive	5 ~ 20 watts	+5V and +12V
Floppy drive	5 watts	+5V and +12V
CD/DVD drive	10 ~ 20 watts	+5V and +12V
Cold cathode lights	3 watts	+12V
LED lights	< 1 watt	+12V or +5V

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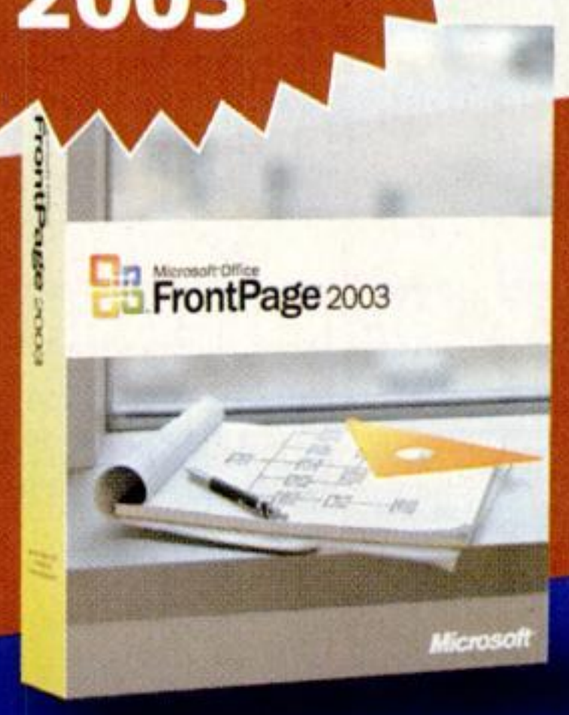

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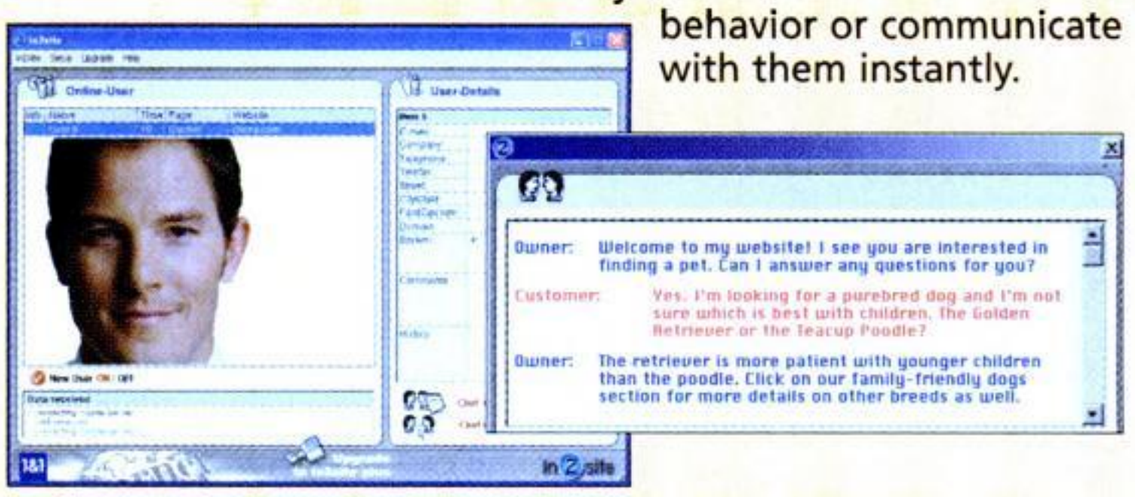
Online-User
User-Details
Owner: Welcome to my website! I see you are interested in finding a pet. Can I answer any questions for you?
Customer: Yes. I'm looking for a purebred dog and I'm not sure which is best with children, the Golden Retriever or the Teacup Poodle?
Owner: The retriever is more patient with younger children than the poodle. Click on our family-friendly dogs section for more details on other breeds as well.
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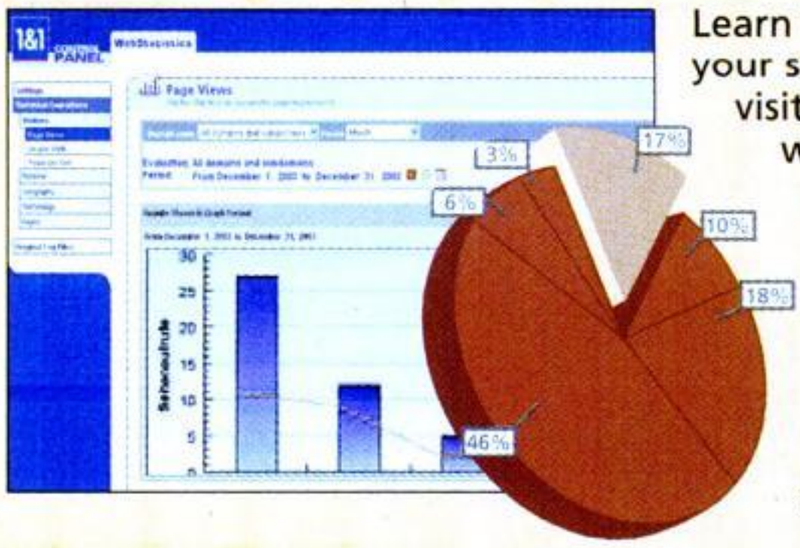

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▪ Manage unlimited domains with one account	✓	✓
▪ Point external domains to 1&1	50	50
▪ Subdomains	5	5
WEBSITE/CONNECTIVITY		
▪ Web space	500 MB	500 MB
▪ FTP accounts, unlimited access	1	1
▪ Included bandwidth/month	5 GB	5 GB
▪ Protected by up-to-date firewall	✓	✓
▪ Daily backups	✓	✓
APPLICATIONS		
▪ 1&1 Control Panel	✓	✓
▪ WebsiteCreator	12 pgs	12 pgs
▪ Full version software worth $550	✓	✓
▪ Frontpage 2003	–	✓
E-MAIL		
▪ POP3 e-mail accounts	50	50
▪ Aliases, auto-responders, forwarding	✓	✓
▪ 1&1 WebMail	✓	✓
▪ Included virus scanner	1 POP3	1 POP3
WEBSITE FEATURES		
▪ Logfiles	✓	✓
▪ CGI library (counter, guestbook, etc...)	✓	✓
▪ FrontPage 2002 extensions	✓	✓
▪ Password protected directories	✓	✓
CRM/E-COMMERCE		
▪ 1&1 WebStatistics	✓	✓
▪ 1&1 Chat channel	1	–
▪ Customizable forums	✓	✓
EXPRESS SUPPORT		
▪ 24/7 support by phone and e-mail	✓	✓

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▪ Included domains at no additional cost	3	3
▪ Manage unlimited domains with one account	✓	✓
▪ Point external domains to 1&1	100	100
▪ Subdomains	50	50
WEBSITE/CONNECTIVITY		
▪ Web space	1000 MB	1000 MB
▪ FTP accounts, unlimited access	5	5
▪ Included bandwidth/month	15 GB	15 GB
▪ Protected by up-to-date firewall	✓	✓
▪ Daily backups	✓	✓
APPLICATIONS		
▪ 1&1 Control Panel	✓	✓
▪ WebsiteCreator	12 pgs	12 pgs
▪ Full version software worth $550	✓	✓
▪ Frontpage 2003	–	✓
E-MAIL		
▪ POP3 e-mail accounts	150	150
▪ Aliases, auto-responders, forwarding	✓	✓
▪ 1&1 WebMail	✓	✓
▪ Included virus scanner	3 POP3	3 POP3
WEBSITE FEATURES		
▪ Logfiles	✓	✓
▪ CGI library (counter, guestbook, etc...)	✓	✓
▪ FrontPage 2002 extensions	✓	✓
▪ Advanced password protection	✓	✓
▪ Perl, PHP3 and PHP4	✓	–
▪ Database	1 MySQL	MS Access
▪ SSH shell access	✓	–
▪ SSI (Server side includes)	✓	✓
▪ Cron Jobs / Scheduled Tasks	✓	✓
▪ Directory Protection	✓	✓
▪ Shared SSL	✓	✓
▪ Active Server Pages	–	✓
CRM/E-COMMERCE		
▪ 1&1 WebStatistics	✓	✓
▪ 1&1 Chat channels	5	–
▪ Customizable forums	✓	✓
▪ in2site Live Dialogue	✓	✓
▪ Newsletter Tool	✓	✓
▪ 1&1 WebDatabase	✓	✓
▪ 1&1 WebElements - Sophisticated Form Editor	✓	✓
EXPRESS SUPPORT		
▪ 24/7 support by phone and e-mail	✓	✓

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▪ Manage unlimited domains with one account	✓	✓
▪ Point external domains to 1&1	200	200
▪ Subdomains	200	200
WEBSITE/CONNECTIVITY		
▪ Web space	2000 MB	2000 MB
▪ FTP accounts, unlimited access	25	25
▪ Included bandwidth/month	30 GB	30 GB
▪ Protected by up-to-date firewall	✓	✓
▪ Daily backups	✓	✓
APPLICATIONS		
▪ 1&1 Control Panel	✓	✓
▪ WebsiteCreator	25 pgs	25 pgs
▪ Full version software worth $550	✓	✓
▪ Frontpage 2003	–	✓
E-MAIL		
▪ POP3 e-mail accounts	300	300
▪ Aliases, auto-responders, forwarding	✓	✓
▪ 1&1 WebMail	✓	✓
▪ Included virus scanner	6 POP3	6 POP3
WEBSITE FEATURES		
▪ Logfiles	✓	✓
▪ CGI library (counter, guestbook, etc...)	✓	✓
▪ FrontPage 2002 extensions	✓	✓
▪ Advanced password protection	✓	✓
▪ Perl, PHP3 and PHP4	✓	–
▪ Database	3 MySQL	MS Access
▪ MS SQL	–	✓
▪ SSH shell access	✓	–
▪ SSI (Server side includes)	✓	✓
▪ Cron Jobs / Scheduled Tasks	✓	✓
▪ Advanced developer tools	✓	–
▪ Dedicated SSL Certificate	✓	✓
▪ ASP, ASP.NET, .NET Framework	–	✓
CRM/E-COMMERCE		
▪ 1&1 WebStatistics	✓	✓
▪ 1&1 Chat channels	10	–
▪ Customizable forums	✓	✓
▪ in2site Live Dialogue	✓	✓
▪ Newsletter Tool	✓	✓
▪ 1&1 WebDatabase	✓	✓
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I recently created a Wi-Fi network and I want to know how I can use it to watch television off a Media Center PC, in real-time, on another computer on the network. Specifically, I want to watch a TV show (not already recorded) on a Tablet PC in another room. Everyone agrees that Windows XP Pro should be able to do this, but no one knows how to accomplish it. Watching recorded shows, playing MP3 files, and sharing items from the hard-drive is no problem, by the way.

—NEIL G. POWELL

That's exactly the kind of feature Windows Media Center PCs need, but as far as the Doctor can tell, there's no way to enable it with this build of the OS.

We've had great luck in the past using *Beyond TV 3* (the software formerly known as *SnapStream*). Using the app on a normal TV via a tuner card, you can stream live or recorded TV programs to a wide variety of devices, from laptops and set-top boxes to Pocket PCs. A demo is available at www.snapstream.com.

IS THERE A DOCTOR IN THE HOUSE?

I was on a road trip with my Acer 803 laptop when the carry-case's strap broke, sending the computer plummeting to the floor. It was a good 4 to 5 foot drop and when I started the computer the next day, I found that the screen was completely blank. I decided to go "surgeon" on the screen in hopes of fixing it myself, but this resulted in a fruitless dismantling of the device. Enraged and frustrated, I decided to cut and dismember the screen altogether. I now have a perfectly good "desktop," but the question is: Is there a company out there that sells a screen and battery that can connect to my "desktop" so it's once more a portable laptop?

—ANONYMOUS

It depends on how much emergency surgery you did on it, Hawkeye. Because notebooks are made by different companies and to different specs, you can't just buy any monitor like you can with a desktop PC. You'll have to buy an LCD panel made for your notebook. You can do research on the Internet for the proper parts and trust that the company sending it to you knows what it's doing, or you can contact one of the numerous notebook repair shops who have access to parts and repair manuals. Option three is to buy a used duplicate of your notebook that has something else broken and transplant the screen. Choppers!

ALL WORK AND NO PLAY...

A year ago I bought a nice PC and vowed I would use it only for work. Well, I finally cracked and began installing games on it and have run into a problem: I can't get a single game to run on my system even though I use my PC for intense music and 3D graphics applications! I have a P4 2.26GHz Rambus system with 512MB of Samsung RAM and a Radeon 9600 Pro. You'd think this would be sufficient to at least boot *Deus Ex 2*, but whenever I try to load a game, I either get a black screen and the game quits, or I get an error with several memory addresses and a message saying "memory could not be written." I've tried moving my page file to another drive, swapping my memory sticks (I have all slots filled), running a memory test program, and all kinds of other things, without results. *DXDiag* shows everything to be OK, and I can run resource-intensive programs like *Logic Platinum*, *Photoshop*, or *Lightwave* (which makes heavy use of OpenGL), but my PC runs scared from anything entertaining!

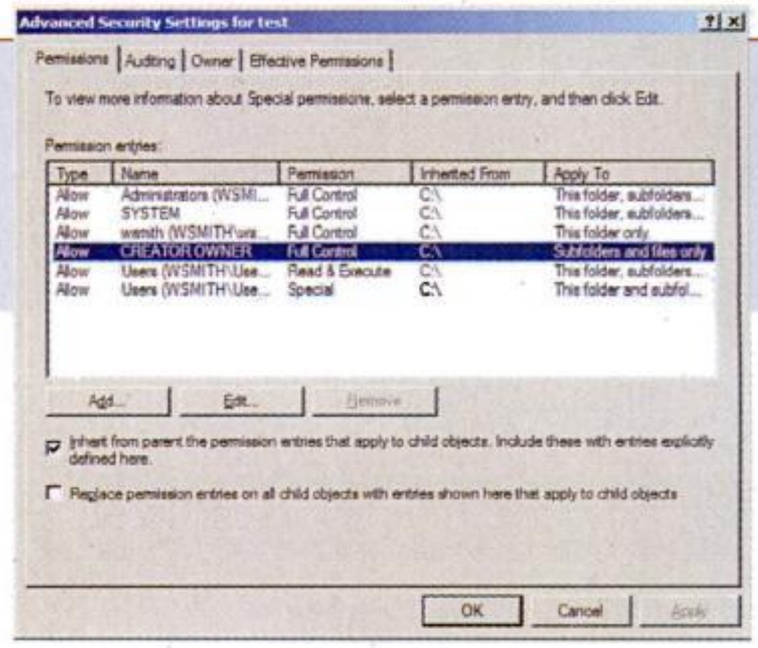
—DEVIN EARTHMAN

It sounds like your machine is missing either DirectX 9 or the latest drivers for your videocard. The fact that *Lightwave* works but DirectX apps don't is the tip-off. You should download and install them both. You can get the latest version of DirectX at Windowsupdate.com or

PUTTING WINDOWS FOLDERS UNDER LOCK AND KEY

Is there a way to securely lock an individual folder in Windows XP? I want to be sure the contents are password protected, secured against a virus attack, and safe from being deleted without the password. Do you know of such a software solution? I have seen several that offer this, but I wanted to consult you first. I was told that Win XP has a way to password protect folders through compression, but this won't solve the issue of deletion, etc. Can you help?

—CORBIN GRIMES


Advanced Security Settings for test
Permissions | Auditing | Owner | Effective Permissions
To view more information about Special permissions, select a permission entry, and then click Edit.
Permission entries:
Type | Name | Permission | Inherited From | Apply To
Allow | Administrators (WSMI... | Full Control | C:\ | This folder, subfolders...
Allow | SYSTEM | Full Control | C:\ | This folder, subfolders...
Allow | wsmith (WSMITH\ws... | Full Control | C:\ | This folder only
Allow | CREATOR OWNER | Full Control | C:\ | Subfolders and files only
Allow | Users (WSMITH\Use... | Read & Execute | C:\ | This folder, subfolders...
Allow | Users (WSMITH\Use... | Special | C:\ | This folder and subfol...
Add... | Edit... | Remove
Inherit from parent the permission entries that apply to child objects. Include these with entries explicitly defined here.
Replace permission entries on all child objects with entries shown here that apply to child objects
OK | Cancel | Apply

By using the folder security settings, you can keep other users out of the Windows XP folders you don't want them to see.

With Windows XP Professional, it's easy to lock down entire drives, folders, or even single files using nothing more complex than the built-in security settings. Beware though, if you mess up your settings, it's possible to completely lock yourself out of a directory.

First, open My Computer and go to the Tool menu. Go down to Folder Options, then click the View tab. Scroll all the way to the bottom and uncheck "Use simple file sharing (Recommended)." Press OK and then browse to the folder you want to lock.

Right-click the folder and select Properties. Click the Security tab and then the Advanced button. Uncheck the box for "Inherit from parent the permission entries...." Doing that will prevent permissions of the parent folder from being applied to the folder you want to protect. Now click the Add button and type in the name of the user account that will have access to your directory. Click the Full Control box in the Allow column on the next screen. Then click OK and remove all the accounts from the Permissions tab except the account you just added and the Creator Owner and System accounts. Then go to the Owner tab, and change the name to the account that should have access.

You can also select Deny in a folder's Permissions to prevent specified users from having access to a folder, but there's a catch. If a user belongs to more than one group and one group is allowed Full Control over a folder, but the other group is denied access, the Deny rule will take precedence. Furthermore, if you incorrectly apply Deny to important system folders, it's easy to render your system unbootable.

Once you have the permissions set properly, you should also encrypt your files. The Windows security settings protect your files only from people who are actually logged on to your computer. If they put your hard drive into another system that reads NTFS, your files are accessible. You can toggle encryption in the Advanced button on the Properties page of the files or folder you want protected.

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IPKonfig

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Doctor

www.microsoft.com/directx, and you can get current drivers for your Radeon at www.ati.com.

PUTTING LOST CLUSTERS WHERE THEY BELONG

When a lost cluster is found via *checkdsk* or *Norton Disk Doctor*, it's saved to a folder as a file named something along the lines of "found001." On many occasions I have identified the fragments recovered and been able to manually return them where they belong. Sometimes they even work. On other occasions, I get a "found file" whose original path is unknown and I have no way to replace it properly, so it resides in its odd folder until the next format and clean install. Is there a reliable way to restore that found file to its proper place?

—GREG HAVENS

Lost clusters used to be a much more common Windows file system error, mainly because older versions of Windows crashed so often. Lost clusters occur when your operating system's file allocation table (FAT) thinks a certain sector of the hard drive is in use when it actually isn't. Say you're working on a *Word* document, and your system crashes or you close the program before your worked is saved. The FAT entry for that file consists of a chain of references that point to the file you are using, but a spontaneous system crash can break this chain and orphan the clusters connected to the original document.

Once lost clusters have been created, you have a few options for dealing with them. First, most file scanning utilities will give you a chance to save the entries before they're zeroed out in the FAT. *Scandisk* will automatically assign it the name FILE001.chk, and sometimes you can even open these files and retrieve data from them. If a file is inaccessible, it's likely a binary file that needs every piece of the original file in order to be opened.

The best way to avoid this whole situation is to upgrade to an OS with an NTFS file system. It provides internal redundancy for the files, so in the event of a crash (which happens rarely) files can be recreated with ease.

IS SOCKET 939 WORTH THE WAIT?

I am collecting the parts for a new PC and was wondering if I should wait until the Socket 939-based boards come out this spring instead of going with the Socket 754 boards currently available. Will the Socket 939 be compatible with either the AMD64 or the 64FX? And when can we expect to see the first boards based on the 939 Socket?

One more question: Will the 939 be compatible with current technology such as DDR400 RAM?

—KEN ULRICH

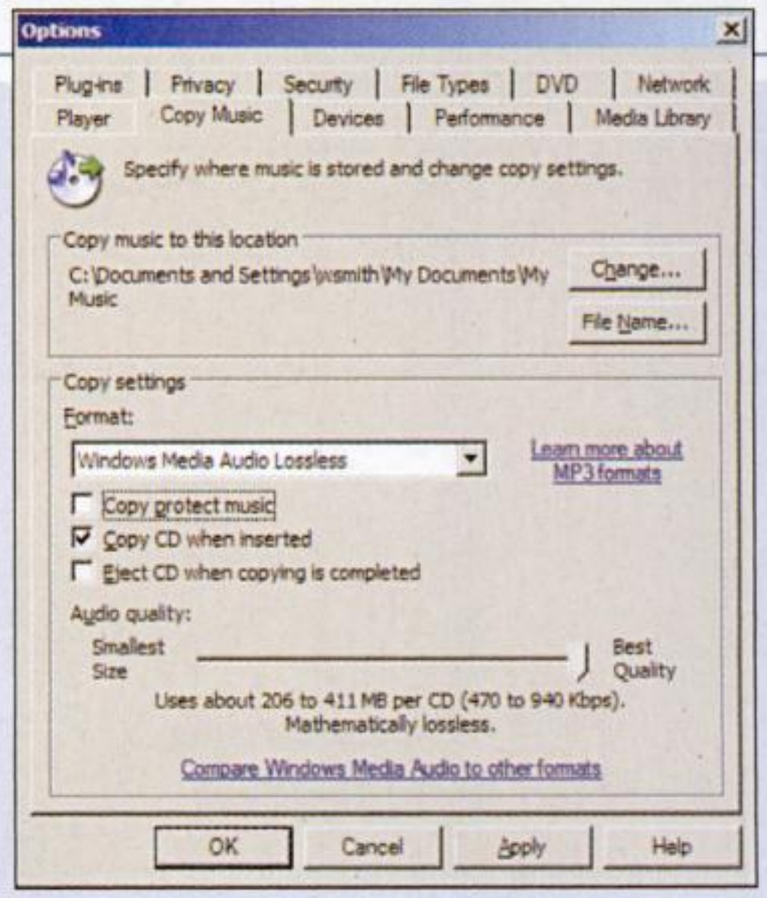
AMD says it's committed to supporting Socket 940 for the Athlon FX through this year. Regarding Socket 754, AMD says it's committed to support for the near future (the Doc interprets this as meaning until mid-2005 or so). Still, bear in mind that any motherboard you buy today will be pretty dated by the end of the year. In fact, with PCI Express, DDR2, and BTX on the way, any current motherboard is about to seem dated real soon. For people who need to update now, the Doc recommends the Socket 754, as the platform offers plenty of power at a good price. If you can wait six months, there's always something better.

As for the RAM: With the memory controller embedded in the CPU, that component, more than the motherboard, really determines memory support. Socket 939 CPUs and motherboards are sure to support DDR400 as it's plentiful. But there will undoubtedly be Socket 939 boards that support DDR2 RAM as well. ■

PLAYING IT BY EAR

I recently backed up all my CDs using the MP3 file format at the maximum-quality, variable-bitrate setting. The music sounded fine, but for comparison I also copied the CDs using the WMA file format at the lossless, variable-bitrate setting, and to my surprise, the WMAs sounded far better and were ripped a lot quicker than the MP3s. Am I doing something wrong? I thought MP3s encoded at a high setting (e.g., 320Kbps or higher) offered superior sound to anything WMA could offer. I noticed that the WMA files were recorded at bitrates up to 800Kbps, but I thought the human ear was incapable of discerning quality differences beyond 320Kbps?

—MARC WAUGH



Compressing your music losslessly lets you make perfect archival-quality backups of all your CDs. You probably didn't know it, but *Windows Media Player 9* comes with a lossless compression function!

A person's ability to discern differences between the two archival methods you describe depends on the quality of the speakers and the acuity of one's hearing.

Remember that MP3 is a "lossy" compression format. It reduces audio file sizes by eliminating the audio data least likely to be heard by the listener. The heavier the compression, the more the compressor is going to have to slice away audio data, eventually degrading the signal audibly.

The codec you used—*Windows Media Player 9*—is a "lossless" compression format, and therefore does not discard data from the original file; instead, audio data is compressed in a way similar to Zip files. So instead of doing something wrong, you actually did something *right*. By archiving your music using a lossless compressor, you were able to reduce the size of the files to almost half their uncompressed size, while leaving the quality of the original CD intact. You can later recompress any or all your tracks into MP3s for your portable player without having to worry about the horrible artifacts introduced by compressing an already compressed signal (as you would by re-encoding your MP3s at lower bitrates).

There are several other lossless compressors available that you might want to try. FLAC (flac.sourceforge.net) and APE (www.monkeysaudio.com) are both lossless, and should produce perfect reproductions of your CDs. There are also a bevy of applications available that will convert both formats to more popular lossy compressed formats, like MP3 or AAC for listening on a portable player.

SECOND OPINION

I have to disagree with your March 2004 solution to Richard Fern's "Legacy App Woes." If you want to get a DOS program to run in Windows, you should download *DOSBox* (**dosbox.sourceforge.net**) and run it with the program in question. *DOSBox* is capable of running a ton of DOS programs in Windows XP. The only problem is that the sound is distorted when you try to run a program at more than 5,000 cycles per millisecond, but that shouldn't be a problem for a database program.

—ZACK GREEN

Like a pink-faced babe reaching for a power outlet with a shiny metal fork, you try to fix your computer. You only lack proper guidance. Without help, your days, or those of your PC, are numbered. Luckily, the Doctor is here. E-mail **doctor@maximumpc.com** with all your computer conundrums.

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Tommy Hilfiger at Jones Beach Theater
New York, NY

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MAXIMUM PC

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How To...

A step-by-step guide to tweaking your PC Experience

BUILD A Media Server PC

BY WILL SMITH

MAXIMUM PC
TIME TO COMPLETION
04:30
HOURS MINUTES

A step-by-step guide to assembling a kick-ass PC that will stream music and video to any room in your home

We love having 20,000 songs and a couple hundred movies and TV shows at our fingertips at any given time. But storing that much data takes a dump truck load of drive space, and running multiple drives makes too much noise for a living room. The solution is simple: Instead of keeping a noisy, expensive PC in every room of your home, just build one monster server to hold all your movies and music, and stream the content to, smaller, quieter, quick-starting, network-connected dumb clients at every TV.

Of course, it's not this simple. A media server isn't something you can just pick up at Best Buy; you'll need to either build a new machine from scratch or adapt an older PC to your new needs.

So what kind of hardware makes the best server? What kind of network gear is required? What software and hardware tie it all together? Stick with us—we'll show you how it's done.

What you'll need:

- A computer with a TV tuner
- A reliable operating system
- A home network—wireless or wired
- The biggest hard drive (or drives) you can afford
- DVD archiving software
- *Beyond TV* (www.snapstream.com)
- An IR blaster to change cable box channels
- Music and video streaming devices

STEP 1

Collect the ingredients

Your home media server doesn't need the latest processor or cutting-edge videocard. Pretty much any Pentium 4 or Athlon XP will do. You will need lots of memory, oodles of hard drive space, an optical drive, and a cable or satellite line to the room housing your PC. You'll also need a soundcard of some sort, or a mobo that features onboard sound support, which is perfectly acceptable for our purposes.

Choose your case carefully—allow plenty of space for upgrades and cooling because the power will be on all the time. You may want to build your media server in a full tower case with lots of drive bays—after all, it'll take multiple hard drives to archive music, TV, and movies. We recommend a minimum of 250GB drive space—that's enough to store more than 200 hours of TV, about 30,000 songs, more than 50 DVDs, or any combination of the three.

The most important component in your media server is the TV tuner. You'll use it to record video from your cable or satellite TV signal. We recommend the ATI TV Wonder Pro ($50) or the Hauppauge WinTV-PVR 250 ($140). Both encode high-quality video and are affordably priced.

There are several options available for a media server OS. Cheapest, but the most difficult to configure, is Linux. If you pay close attention to the hardware you purchase—not all TV tuners and media streaming boxes have Linux drivers—you can build a top-notch Linux-based media server. For sheer simplicity of setup and ease of maintenance, we recommend using a Windows-based server instead. Windows XP Professional is sufficient for a low-traffic server with just a few simultaneous connections, but as you connect more TVs and add functionality, you should consider upgrading your rig to Windows Small

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STEP 1 continued

Business Server 2003. Small Business Server is more robust than Windows XP, and it includes a web, e-mail, and FTP server. Make sure your video capture card is compatible with Small Business Server 2003; many integrated AGP/Video-capture boards are not. We recommend against using Windows XP Home because it doesn't support advanced file-sharing.

To stream video and music from your server to the living room, you'll need some kind of streaming device. One option is to purchase a networkable DVD player, which will play normal DVDs, as well as stream music, MPEG-2 movies, and unencrypted whole DVDs across a network. There are also a variety of stand-alone boxes that stream standard media formats across a network. We're impressed with Hauppauge's MediaMVP (**www.hauppauge.com**) and Slim Devices' Squeezebox (**www.slimdevices.com**). Important note: The Squeezebox supports only audio files, not video.

Next, you need to get your software. For near-TiVo PVR functionality on the PC, we recommend *Beyond TV* (**www.snapstream.com**), which lets you record TV shows to a single computer, then stream them to any number of wireless PCs or other devices. Combine a *Beyond TV*-equipped server with a video streaming box, and you'll attain multi-room, networked PVR nirvana.

Finally, make sure you have a complete suite of DVD software; you'll need both a ripper and a DVD-authoring app. *DVD Shrink* (find it on Google) lets you archive your DVDs to folders on your hard drive, and recompresses them while it rips to conserve space. We recommend Sonic's *MyDVD* for authoring because it's easy to use yet still powerful in the hands of an expert.

STEP 2

Assemble your server

Building a media server is essentially like building any other machine. Remember, though, this system is going to run 24 hours a day, so adequate cooling is paramount. You should dedicate a couple of fans solely to the task of pulling in cool air over the hard drives as well as the other components. This will greatly increase your drives' lifespan, and help protect your precious data.

Once you've configured the hardware, you need to install the operating system. Installing Windows Server 2003 is almost exactly like installing Windows XP. Keep a few things in mind: First, for any server environment, it's a good idea to keep your applications and data on separate hard drive partitions. We recommend you create a small, 30GB partition for the operating system and application files. Leave the rest of your drive space unformatted for the time being—we'll take care of that later. Second, there's no reason to create a domain or enable Active Directory for your home network, so you can safely choose the Workgroup options for those two items during the networking portion of the install process. Third, we recommend against using your media server to share your Internet connection. Use a dedicated router instead; you can still give Internet users access to specific services on your server, but connecting an always-on server directly to the Internet makes it a big, fat target for worms, Trojans, and other Internet nasties.

Because your media server will be on 24/7, it's important to make sure your rig's cooling scheme is fully baked. Without proper cooling, your machine will melt down, and your media server will serve you no more.

Windows xp
Collecting information
Dynamic Update
Preparing installation
Installing Windows
Finalizing installation
Setup will complete in approximately: 39 minutes
An exciting new look
Windows® XP Professional sports a brand-new visual design that combines a sleek look, clean lines, and appealing colors with a task-oriented design and exceptionally streamlined navigation.
The redesigned Start menu makes it easier to find important information and to access the programs you use most frequently.
By automatically cleaning up the notification area of the taskbar and grouping related taskbar items, Windows XP makes it easier to switch between programs and to open, view, or close multiple items at the same time.

Once your hardware is assembled, you need to install and configure your operating system. We used Windows XP Pro for our media server.

When your machine is up and running, install your software applications—*Beyond TV*, your DVD ripping app, and your DVD authoring app. Don't start the *Beyond TV* configuration wizard yet; we'll set up the PVR software once we get all the drives configured.

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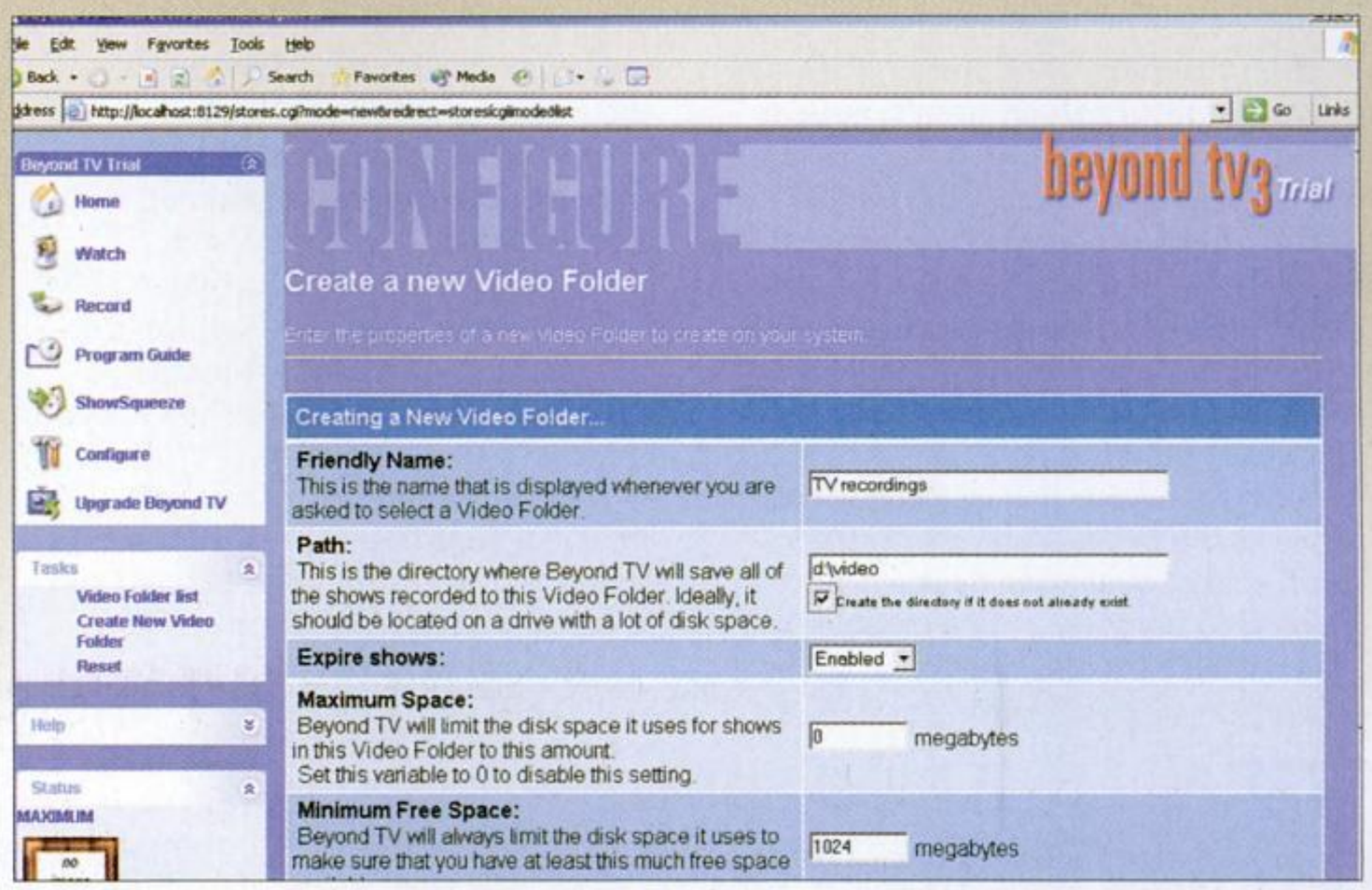
STEP 3

Create a sensible storage scheme

Before you begin heedlessly ripping DVDs or recording TV shows, you need to develop a standardized scheme for storing your digital goodies. Some people recommend using a dedicated partition for each type of media—music, TV, and DVDs—but we find that a bit restrictive. We do recommend isolating your PVR files on one partition, though. Because PVR files are constantly being written and deleted, the drive that the PVR writes to will quickly become fragmented. Once you've created that partition, you'll want to use the remaining space for ripped DVDs and music.

Before you can create the partition, you need to decide how much drive space you want to dedicate to your PVR. Keep the following metric in mind: If you use DVD-quality MPEG-2, you'll eat a little less than 1GB of disk space for every hour of recorded video. We allocate at least 80GB for our PVR duties, but if you watch loads of TV, feel free to set aside even more.


File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://localhost:8129/stores.cgi?mode=new&redirect=storesicgimodedlist
Go Links
Beyond TV Trial
Home
Watch
Record
Program Guide
ShowSqueeze
Configure
Upgrade Beyond TV
Tasks
Video Folder list
Create New Video Folder
Reset
Help
Status
MAXIMUM
CONFIGURE
beyond tv3 Trial
Create a new Video Folder
Enter the properties of a new Video Folder to create on your system.
Creating a New Video Folder...
Friendly Name:
This is the name that is displayed whenever you are asked to select a Video Folder.
TV recordings
Path:
This is the directory where Beyond TV will save all of the shows recorded to this Video Folder. Ideally, it should be located on a drive with a lot of disk space.
d:\video
Create the directory if it does not already exist
Expire shows:
Enabled
Maximum Space:
Beyond TV will limit the disk space it uses for shows in this Video Folder to this amount.
Set this variable to 0 to disable this setting.
0
megabytes
Minimum Free Space:
Beyond TV will always limit the disk space it uses to make sure that you have at least this much free space
1024
megabytes

Once you've created a dedicated partition for your PVR files, you need to open *Beyond TV* and point it to the new drive.

To create the PVR partition, go to Start, then Control Panel, then Administrative Tools. Click on Drive Management, and then right-click the empty space on the drive. Click Create Partition, then type the size you want your partition to be in megabytes—remember that 1GB equals 1,000MB. Once the partition is created, you'll need to format it. Use the NTFS format and the default cluster size. Name the volume "PVR." Make sure you open *Beyond TV's* control panel and tell it to save recorded video files to the new partition.

While you're inside the Drive Management utility, go ahead and create a third partition. This one will hold your ripped DVDs and music, and should fill up the rest of the drive. Format this drive using the NTFS file system and name it "Media." Once the partition is formatted, you'll want to create a couple of directories on it—one for ripped DVDs, and one for MP3s. Right-click the DVD directory, and select Sharing. Click the "Share this folder" button and press OK. Do the same for the MP3 directory.

NETWORKING CONFIGURATION TIPS

✔ **It's easier to find your media server if its IP address never changes. You can give it a static IP address, but you need to ensure that your router's DHCP server won't try to assign the same IP address to another computer. Consult your router's documentation to find out how to exclude an IP range from the DHCP service.**

✔ **It's also easy to host a small personal web site, or set up a streaming server to access your tunes, TV, and movies from outside your home network. Via your router's firewall feature, specific types of requests that come to your IP address can be automatically forwarded to your media server's internal address. Check your manual for input on port forwarding.**

STEP 4

Putting the "u" into user

With your basic drive structure complete, it's time to create some user accounts and groups. Whether you use Windows XP Professional or Windows Server 2003, the components are in the same place for the most part. You can control exactly what level of access every user has to every directory, whether they're logged in to the computer directly, or merely connecting across the network. First, you'll need to create some user accounts, though.

Everyone who regularly logs in to your machine should have a user account. To create accounts, open the Computer Management applet again—remember, it's in Start, Control Panel, Administrative Tools—and select the Local Users and Groups tool. Open Users, and create some users. Simply right-click an empty area and select New User. Fill in a username and password and press Create. Rinse and repeat until you've created accounts for everyone who should have access to your server.

Now, this is the tricky part. If you have a lot of users, it's a real drag to go into each folder you make available on the network and manually change the permissions every time you add or remove a user. To avoid doing this, you can create groups, and assign the permissions you want to each group. Then you can place individual users in your groups.

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5 USES FOR YOUR NEW MEDIA SERVER

STREAM MUSIC TO YOURSELF AT WORK You can install Slim Devices' *Slimserver* software on your server, even if you don't have a Squeezebox. Once installed, you can use it to stream tunes to any computer on the Internet. Just point *Winamp*, or another streaming client, to http://*your.IP.address.here*:9000/stream.mp3. You'll be able to set up playlists and change songs using your web browser. Go to www.slimdevices.com to get it.

squeezebox
Music Player
SKIP | PLAY | PAUSE | STOP
VOLUME: 1 2 3 4 5 6 7 8 9 10 11
REPEAT: ONE | ALL | OFF
SHUFFLE: OFF | SONGS | ALBUMS
NOW PLAYING:
12. Tonight is the Night I Fell Asleep at the Wheel from Maroon by Barenaked Ladies
THE CURRENT PLAYLIST: SAVE | DOWNLOAD | CLEAR
PAGES: 1 2 3 4 5 6 7 8 9 10
13. By Starlight from Mellon Collie & The Infinite Sadness-Disc 2-Twilight To Starlight by Smashing Pumpkins
7. Summer '79 from So Long, Astoria by The Ataris
10. One Hot Minute from One Hot Minute by Red Hot Chili Peppers
6. Knock Me Down from Mother's Milk by Red Hot Chili Peppers
3. Justify the Thrill from Straight on Till Morning by Blues Traveler
3. Learn To Fly from There Is Nothing Left to Lose by Foo Fighters
2. It's All Been Done from Stunt by Barenaked Ladies
4. Dreams of Our Fathers from Everday by Dave Matthews Band
4. My Friends from One Hot Minute by Red Hot Chili Peppers
12. Proudest Monkey from Crash by Dave Matthews
2. Fire From Heaven from Walking In The Shadow Of The Big Man by Guadalcanal Diary
5. Margot Known as Missy from Down in the Shacks Where the Satellite Dishes Grow by The Judybats

SHARE PHOTOS By creating a photo directory that's shared over the network, you can make all your digital photos accessible to every PC and streaming device in your house. Make a new directory on the same drive as your music and ripped DVDs, create a Photo user group, assign it the proper permissions, and add the appropriate people to the group. It's that simple!

SET UP A PERSONAL WEB SERVER Now that you have a machine that runs uninterrupted 24/7, you really have no reason not to have a personal web server. Either use Microsoft's IIS server that's included with Windows XP Pro and Windows Server 2003, or download the free Apache web server (www.apache.org). Combine a basic web server with a dynamic DNS service—like the one provided by DynDNS.org—and you can even host a domain on your home page.

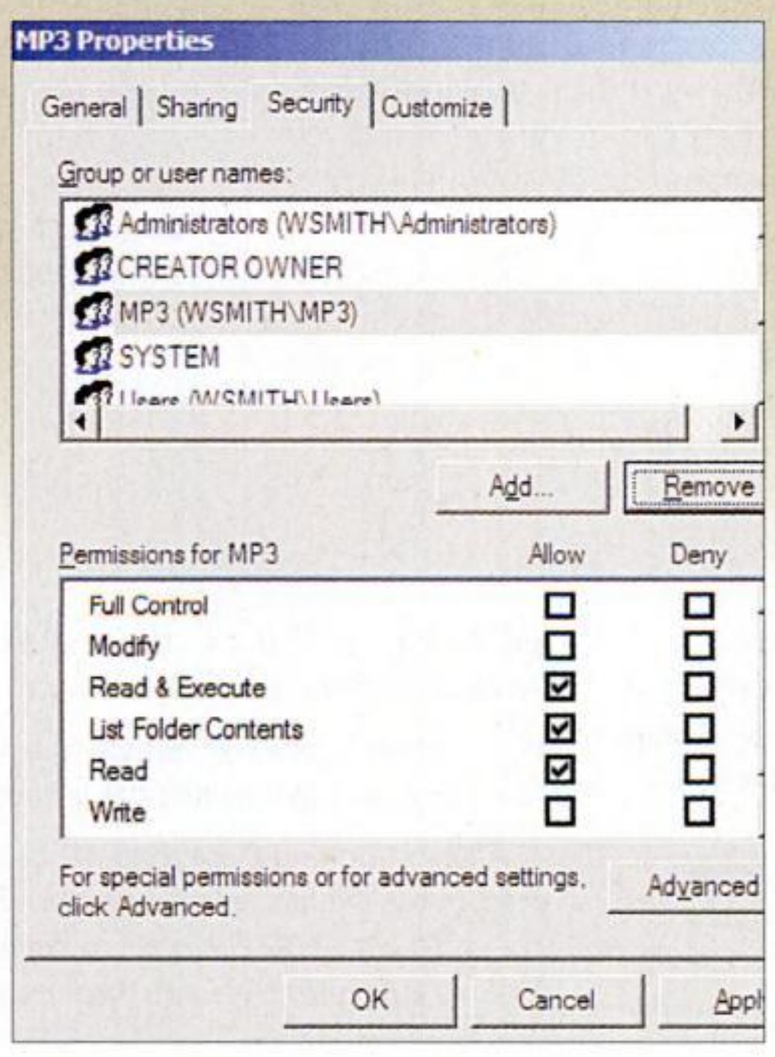
CREATE A PRIVATE MUSIC-SHARING NETWORK With all your MP3 files in a central location connected to a high-speed, always-on Internet connection, your machine could form the backbone of a private peer-to-peer network. The new *Waste* client supports über-high shared-key encryption—up to 4,096 bits—and you can control who has access to the network. Get it at http://waste.sourceforge.net.

STREAM LIVE TV TO YOURSELF—ANYWHERE! If you properly configure the *Beyond TV* software, your system can transcode recorded and live video on the fly to just about any format. This means that, as long as you have an Internet connection, you need never miss your favorite shows. You can connect to *Beyond TV* and watch whatever you want, whether it's live TV or last night's Giants game.

STEP 4 continued

To set permissions for a new user, all you need to do is add them to the appropriate groups. We recommend creating a group for MP3, DVD, and TV access. That way you'll be able to specify which media types each user has access to.

Of course, you still need to add your new groups to the Permission list for each of your directories. Give the MP3 group Read access to the MP3 directory, the DVD group Read access to the DVD directory, and the PVR group Read access to the PVR directory. Any user who is in one of those groups will be able to browse the appropriate directories from the network. If they're not in the network, they can't browse.



When creating user accounts, you can control the level of access each user has to any directory on your system by adjusting this Security tab.

STEP 5

Putting it together

Now it's time to pull together everything we've done. Connect your cable or satellite receiver's video and audio outputs to the video and audio inputs of your TV tuner card. Then, connect your IR blaster—you can get one that works with most cable and satellite receivers from SnapStream's web site—to your PC. Start the *Beyond TV* configuration wizard, and answer each question. The only potential problem you might have is that you could select the wrong audio input during the install process. You'll know you selected the wrong input if your recorded video files have images, but no sound. To fix it, go into the *Beyond TV* control panel, and try different audio inputs until *Beyond TV* successfully records video with sound.

Once the PVR software is installed and running, you need to connect your streaming devices to the network, install whatever software the streaming boxes need on the server, and configure it to display the appropriate directories.

Once you've connected your streaming devices to the server, you're ready to sit back and enjoy your new media server! ■

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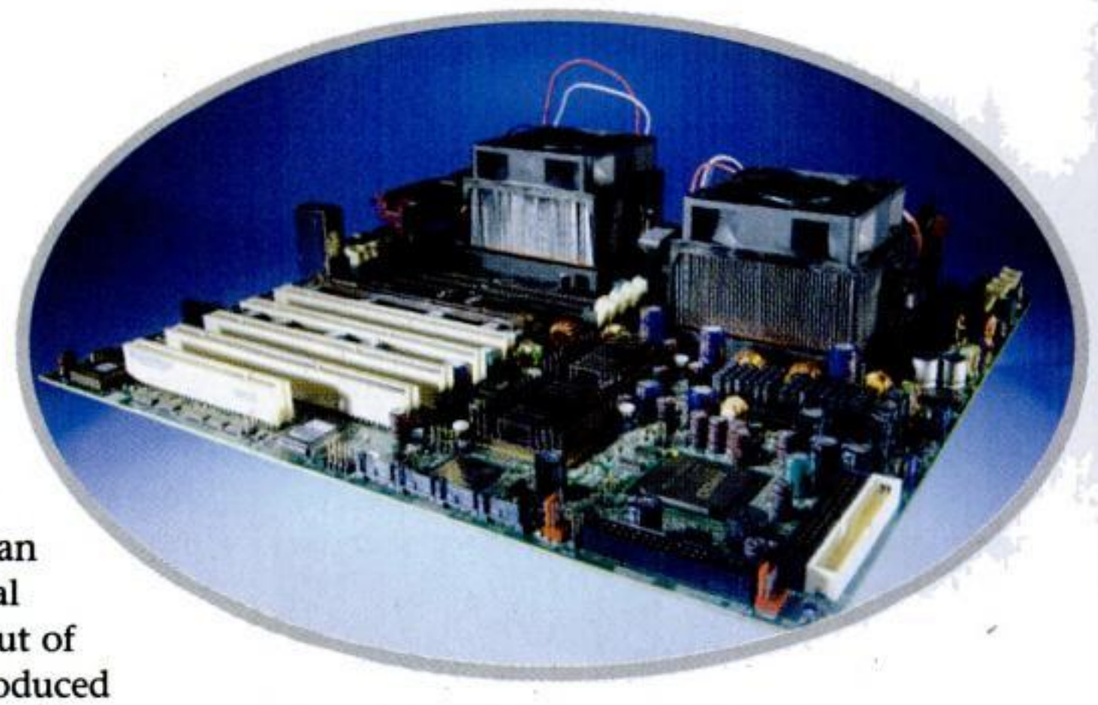
In the Lab

A behind-the-scenes look at Maximum PC testing

Dual Athlon FX Fantasies

Is it possible to use FX-51 CPUs in a dual-proc setup? The Maximum PC Lab investigates



Our lustworthy goal: to get two Athlon 64 FX CPUs to run in this Tyan Thunder mobo.

Like many technophiles, few things get us worked up like hot CPU-on-CPU action. So, needless to say, when our dual-Opteron setup (built for this month's Speed report on page 28) blew away our benchmark tests, we got all hot and bothered. And we started fantasizing about running a dual-CPU rig at home.

Unfortunately, setting up a dual-processor rig isn't as cheap or accessible as it used to be. Five years ago, you could build a relatively affordable dual-Pentium III box, but those days are long gone. Intel ended the poor-boy DP ride when it introduced the Pentium 4, which lacked dual-CPU support. This meant that if you wanted a dual-processor box, you had to pay for it in the form of the much more expensive Intel Xeon CPUs.

In the AMD camp, fans of dual-processor systems have long championed the Athlon MP for its low price and great performance. Like Intel, AMD also tried to lock down dual usage when it released the new Athlon XP, but users soon found hacks to unlock its potential for use in dual-processor motherboards. Meanwhile, the Opteron has been the company's official dual-proc CPU, and comes in the 100, 200, and 800 series; the 100 designates a single processor, the 200 designates dual-proc support, and 800 means you can use *eight* CPUs in one PC. (Dual Athlon MPs, of course, went out of style last year when AMD introduced the final bin speed for the proc: the Athlon 2800+.)

But what about the FX-51? The short history of the FX is that AMD wanted a punchier chip to compete with the P4, so it took the fastest Opteron chips off the fab and renamed them Athlon 64 FX. This combined with the fact that the FX-51 will drop in price as faster clock speeds are released made us wonder: Is it possible to use two FX-51s in a dual motherboard?

AMD has long denied this functionality, but we decided to find out for ourselves. We yanked one of the Opteron 248 CPUs out of the Tyan Thunder K8W mobo we used in this month's Speed trial and added an Athlon 64 FX-51. Because the 248 and FX-51 both run at 2.2GHz, we didn't anticipate any problems. When the machine actually posted, we became giddy—had we just caught AMD telling fibs?

Unfortunately, we soon discovered that even though the PC booted into Windows XP, it only recognized one processor—the Opteron 248. It was as though the Athlon 64 FX wasn't even installed. AMD, it turns out, wasn't pulling our IDE cables; the FX really doesn't work in dual mode. Damn!

But it's not like building a dual box would be cheap, anyway. The Tyan Thunder K8W costs $500 and requires an expensive EPS12V power supply like PC Power and Cooling's TurboCool 510 Deluxe. Dual rigs also slurp down electricity; just turning on the dual-Opteron box and watching it idle with no activity in Windows uses roughly twice the power of a single-processor machine.

Perhaps the low-cost dual processor is really just a fantasy after all—for now, at least. Rest assured that we'll be investigating more opportunities for steamy CPU-on-CPU action in the future.

How We Test: Wireless Routers

Want to test wireless router performance the *Maximum PC* way? Analyzing wireless networking hardware isn't as straightforward as running videocard or CPU benchmarks, but we devised a suite of tests that produce real-world, repeatable results. Here's how it's done:

➤ First, we set up a private network that's disconnected from the Internet and any other network. One PC is connected to the router using standard 100baseT Ethernet, while another PC is connected via the wireless network. We enable 128-bit WEP to more closely emulate real-world conditions.

➤ Next, we transfer a compressed MPEG-2 video file that's larger than 300MB from a Windows shared folder on the wired machine to the wireless machine and measure how long it takes to transfer.

➤ Once that's done, we transfer the file back to the wired machine's shared folder and measure the amount of time it takes.

➤ After performing these tests, we connect the router to the Internet and check to see if it has features such as VPN support, a firewall, port forwarding, and a virtual DMZ. A good router will have all this and more—if these features are present, we turn them on to see how they work.

➤ We calculate the final verdict by factoring in performance, features, and the hardware's overall ease of installation.

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MoodLogic

TESTED & GEEK APPROVED

Easy, automated, and intuitive playlist building

If you're like us, you have three or four gigabytes of favorite MP3s that only get heard when you create a random playlist. *MoodLogic* (**www.moodlogic.com**) aims to change that by automatically creating playlists of songs that share a similar "feel." This application, which has quickly become a *Maximum PC* favorite, scans all the songs in your music directory, identifies each song using information embedded in its ID3 tag as well as *MoodLogic's* own database, and then creates associations within your collection.

There are two ways to create a new playlist: You can select a single track and press the Mix button, which will fill it with tunes of a similar genre. Say, you pick a Red Hot Chili Peppers song, your mix will include songs by 311, Audioslave, and the Foo Fighters. Pick a Beck tune, and your mix will include They Might Be Giants and the Ben Folds Five.

An alternate approach is to start with a particular genre, then choose the mood you want represented—selections range from "Blue," e.g. melancholy and slow, to the hyped-up and happy sounds of "Get Up." Granted it lacks the personal involvement of a traditional mix tape, but we appreciate the interesting, off-beat CDs we can make with *MoodLogic* in seconds—as opposed to the hours it takes to sift through thousands of songs.

Best of the Best

As of June, 2004

If you're going to plunk down $400-plus for the fastest videocard in town, we recommend that you wait another month. Why? It's clear that upcoming videocards based on nVidia's GeForce 6800 Ultra and ATI's Radeon X800 XT chip spank today's cards, so it makes no sense to splurge now. Just wait one more month. ATI still holds a spot with its AIW card and the Radeon 9800—now the top budget card. Because Hitachi's 400GB 7K400 comes in both SATA and parallel versions, it has supplanted the WD2500 JB. And on the CRT front, the Budget category has been cut due to lack of interest, and we're told Sony's F520 display has been replaced by a newer model, the GDMC-520K. You can still buy the F520 so it stays in the High-end slot, but expect an upcoming review to settle who makes the best CRT.

High-end videocard:
Hold

Budget videocard:
ATI Radeon 9800

Do-everything videocard:
All-in-Wonder Radeon 9800 Pro

Soundcard:
Sound Blaster Audigy 2 ZS Platinum

Serial ATA hard drive:
Western Digital 740GD/ IBM 7K250

Parallel ATA hard drive:
Hitachi 7K400

CD-RW drive:
Plextor PlexWriter Premium

DVD burner:
Plextor PX-708A

LCD monitor:
Dell 2001FP

High-end CRT monitor:
Sony F520

Budget CRT monitor:
Cornerstone P1750

P4 motherboard:
Chaintech 9CJS Zenith

Athlon XP motherboard:
Asus A7N8X Deluxe Rev 2

Athlon FX motherboard:
Asus SK8V

Portable MP3 player:
Apple iPod 40GB

Photo printer:
Canon i900

Pocket PC PDA:
HP iPaq 5555

Palm OS PDA:
Palm Tungsten C

7.1 speakers:
Creative Labs 7.1 Gigaworks S750

5.1 speakers:
Logitech Z-680

4.1 speakers:
Logitech Z-560

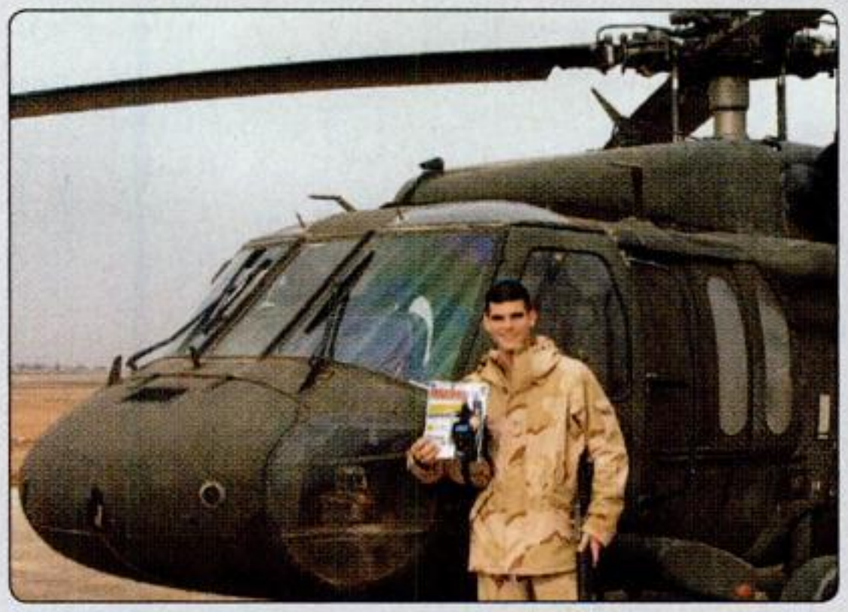
2.1 speakers:
Logitech Z-2200

Our current gaming favorites: *Our current gaming favorites: Splinter Cell: Pandora Tomorrow, Battlefield Vietnam, Unreal Tournament 2004, Planetside*

Maximum PC Reader Photos!

Lately we've found ourselves inundated with reader picture submissions. The common motif: people holding or reading *Maximum PC* in exotic locales.

In December 2003, loyal reader Bob Somers sent us a pic of himself planting the *Maximum PC* flag atop Mt. Whitney. Thanks for the plug, Bob!



Meanwhile, over in Iraq, PFC Luciano Teboucas is flying the *Maximum PC* colors along with the red, white, and blue. Be careful over there, Luciano, and thanks for reading!

A reader from Nevada recently sent us her three-month ultrasound, and all we have to say is, "Welcome aboard, unnamed fetus!"

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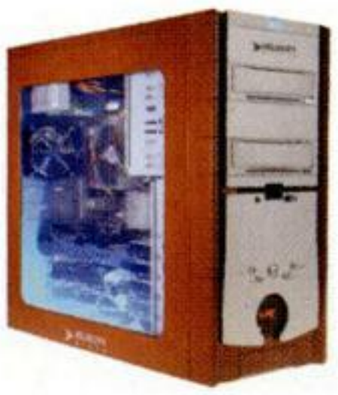
Velocity Micro ProMagix

This speedy desktop PC feels like déjà vu all over again



Back in August 2003, we fell in love with Velocity Micro's P4-based Raptor PC. Its top-of-the-line components and blazing-fast performance in our benchmark tests merited it a 9 verdict and our coveted Kick Ass award. Aside from a few updates to the hardware, Velocity Micro's recently released ProMagix A/V/D Digital Media system, is an almost exact replica of the Raptor (the company obviously subscribes to the "if it ain't broke, then don't fix it" school of thought).

The ProMagix comes loaded with a Pentium 4 3.4GHz Extreme Edition that's been slightly overclocked to 3.47GHz, the reliable Intel D875BZ motherboard, and a gig of high-end Corsair memory. When we reviewed the Raptor way back when, we raved about its ample storage, and Velocity Micro delivers the storage goods again by stuffing the ProMagix with two 74GB Western Digital Raptors in a RAID 0 array for performance, and two 250-gig 7,200rpm Western Digital drives—also linked in a RAID 0 array—for a Caligulan amount of hard drive space. The system also comes with both a DVD+/-RW and CD-RW burner. Everyone's favorite piece of obsolete hardware, the floppy drive, rounds out the storage package. The ProMagix's audio capabilities have been improved slightly with the ZS version of the Audigy 2 soundcard.

For video, the ProMagix comes with a slightly overclocked eVGA GeForce FX 5950 Ultra, a surprising choice considering that the Raptor had such success with a Radeon 9800 Pro. Still, the 5950 Ultra is no slouch, so we can't complain. We should also note that Velocity Micro, along with eVGA, offers a generous 90-day videocard upgrade policy that allows users to migrate to nVidia's new NV40-based chipset when that hardware becomes available.

The 5950 Ultra's dazzling performance helped the ProMagix power its way through our benchmarks. We were especially impressed in our gaming benchmarks, where the rig delivered a forceful 69.7 frames per second in Jedi Academy and 44.3 frames per second in Halo. The ProMagix also excels in its intended capacity as a Digital Media system, as evidenced by its high scores in our Photoshop, Premiere Pro, and MusicMatch benchmarks.

The ProMagix also blew us away by posting an unprecedented, mind-blowing 219 in our SYSmark2004 benchmark. This score shattered the previous high of 204 set by the Athlon 64 FX-53–based Polywell we reviewed just last month. This record-breaking performance continues the tradition set by the Raptor, which itself broke the SYSmark 2002 record when it was lab-tested.

It's clear that Velocity Micro, realizing it had a good thing going with the Raptor, didn't break from that design when fashioning the ProMagix. However, we would have liked to see some sort of tangible progression in the system's design, especially given the amount of time that has elapsed since the Raptor was introduced. Ultimately, though, performance trumps repetitive design, and it's hard to look down on the fastest PC the Maximum PC lab has seen to date.

—TAE KIM

The Velocity Micro ProMagix is unbelievably fast, but it's nothing we haven't seen before.

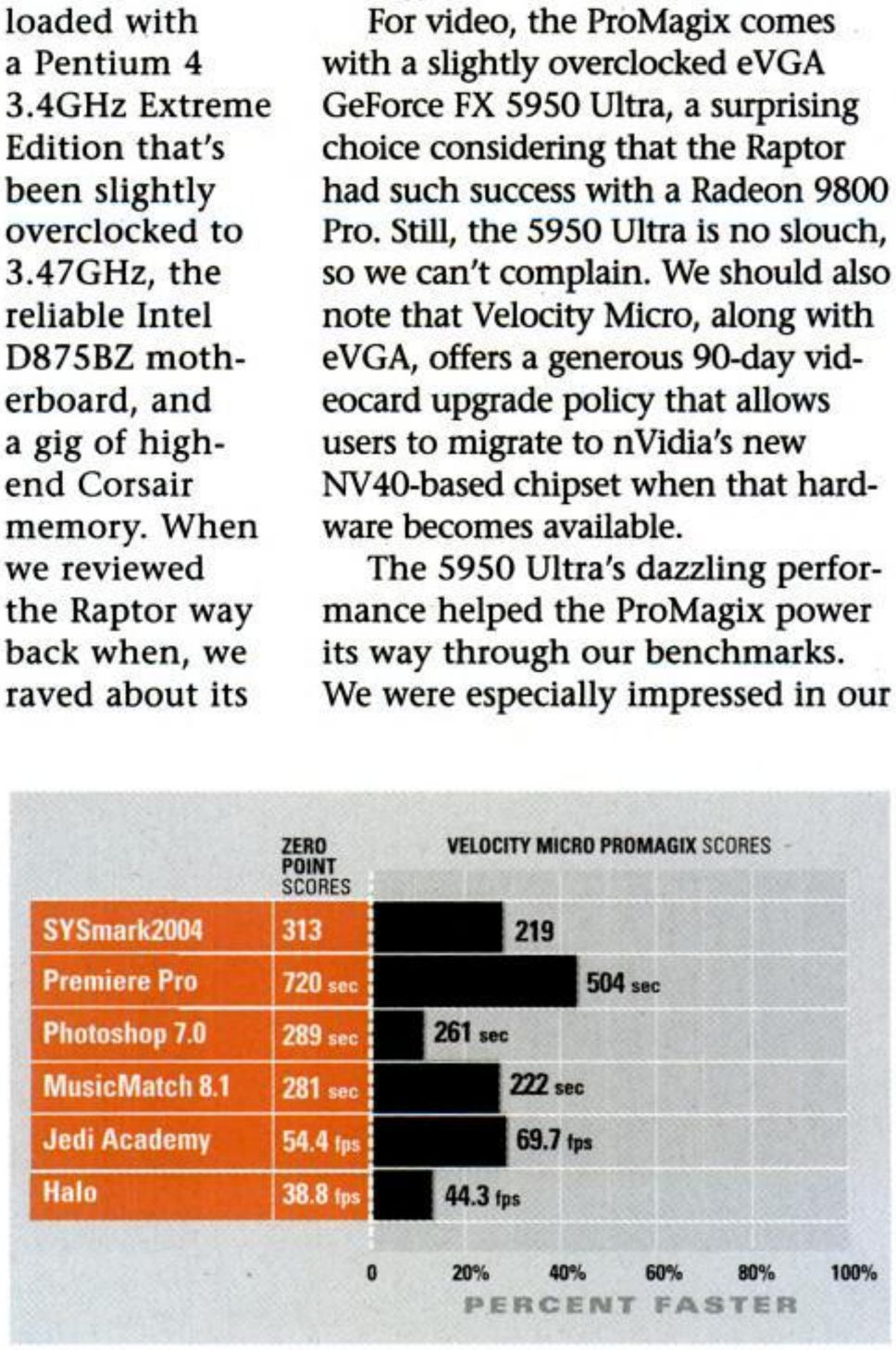
UNDER THE HOOD

DISPLAY	
CPU	Intel Pentium 4 Extreme Edition 3.4GHz (overclocked to 3.47GHz)
Mobo	Intel D857PBZLK (Intel 875P, 800 FSB)
RAM	Corsair PC3200-XMS DDR400 Extreme Memory (two 512MB sticks
I/O ports	Eight USB 2.0, parallel, serial, two FireWire, mic, headphone, three line-in, three analog out, one optical in/out, one coax digital in/out, MIDI in/out
LAN	Intel Pro/1000 Gigabit Ethernet (Integrated)
DISPLAY	
Videocard	eVGA GeForce FX 5950 Ultra (576MHz core/500MHz DDR)
STORAGE	
Hard drives	Two 74GB Western Digital Raptors (10K rpm, SATA) Raid 0, two 250GB Western Digital WD2500JB (7,200rpm, parallel) Raid 0
Optical	Lite-On DVD+/-RW (LDW-851S, 8x DVD+R, 4x DVD-R, 4x DVD+RW, 2x DVD-RW, 40x CD-R, 24x CD-RW, Lite-On 52x CD-RW/16x DVD-ROM combo drive
Other	1.44MB floppy drive
AUDIO	
Soundcard	Creative Sound Blaster Audigy 2 ZS Platinum Pro with external drive
FINE DETAILS	
Case	Blast Red and Silver DX-W case with front mounted LED display
Power supply	Antec 500-watt PSU with dual fans
Fans/extras	Two case fans, single blue cold-cathode chassis light, case window
Mouse	Logitech Cordless MX700
Keyboard	Logitech Cordless MX Duo keyboard

BUNDLE

Windows XP Pro, Ulead Digital Creation Suite, Open Office 1.1

BOOT: 48.6 sec. **DOWN: 17.4 sec.**



Our zero-point system includes: a 2.2GHz Athlon 64 FX-51, an Asus SK8N motherboard, 1GB of Corsair Registered TwinX DDR400 RAM, an ATI Radeon 9800 XT, a 250GB Western Digital WD2500JB hard drive, Plextor PX-708A DVD burner and a PC Power and Cooling TurboCool 510 Deluxe power supply.

MAXIMUM PC VERDICT 9

YOGI BEAR

Incredible performance, fantastic storage options.

RANGER SMITH

No significant progression in system design or component choice.

$4,260, www.velocitymicro.com

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SECOND PRIZE (10)

Ten Second Prize Winners will receive a retail version of Battlefield Vietnam for Windows® (approximate retail value $50).

SPECS: ALIENWARE AREA-51

CPU ..... P4 3.2GHz,1GB RAM
GRAPHICS CARD ... NVIDIA GeForce FX 5950
SOUND CARD ..... Creative Labs SB Audigy 2 ZS
DRIVES ..... DVD-ROM, Lite-On CD-RW
PERIPHERALS ..... Microsoft Keyboard and Mouse
SYSTEM ..... Windows XP Home Edition

PC CD-ROM SOFTWARE for Windows(R)

EA GAMES

ColorWare® Computer Products

PLAYS BEST ON ALIENWARE™

Battlefield Vietnam Contest Rules

No purchase is necessary to win. Entries must be received no later than August 23, 2004. The winner will be chosen on or about August 24, 2004, and will be notified by regular mail. The odds of winning depend on the number of entries received. Future Network USA, Inc. ("Future USA"), cannot be responsible for lost, late, misdirected, or incomplete entries. The prizes are nontransferable and no substitutions will be allowed. Winners will be determined by a single random drawing of all valid entries, and the decision of Future USA shall be final. You may obtain the name of the winner by sending a stamped, self-addressed envelope to Future Network USA, Inc., c/o Maximum PC–Battlefield Vietnam Contest, 150 North Hill Drive, Brisbane, CA 94005. This contest is open to residents of the United States only. Return of any prize or prize notification as undeliverable will result in disqualification and an alternate winner will be selected. The winner may be required to sign an affidavit of eligibility/release of liability/prize acceptance within seven days of receipt; failure to do so upon request will result in forfeiture of the prize. By acceptance of the prize, the winners agree to the use of their names and/or likenesses for purposes of advertising, trade, or promotion without further compensation, unless prohibited by law. Neither Future USA nor the co-sponsors, ColorWare and Electronic Arts, shall be responsible for any damages or expenses that winners might incur as a result of this contest or the receipt of any prize. Winners are responsible for paying any income taxes on the value of the prize received. Void in Rhode Island, Puerto Rico, Florida, and where prohibited by law.

MSI MEGA 865 Deluxe

An attractive small formfactor marred by buggy software

Last year, MSI broke new ground in the small formfactor (SFF) category when it introduced its first MEGA box. Short for MSI Entertainment Gaming Appliance, the original MEGA merged an AM/FM clock radio with a small formfactor PC.

The latest MEGA 865 Deluxe improves on the original design with an updated LED display, faster chipset, and revamped styling. To complete the package, MSI is offering an optional TV tuner via a chip-based silicon card. As is the case with ATI's All-in-Wonder 8500 card, chip-based tuners change channels faster than more generic "tuner-in-the box" designs.

The MEGA 865 lets you play the radio or a CD without having to power the PC. But when the MEGA is powered on, you can use MSI's home-grown *Media Center III*. Not to be confused with Microsoft's *Media Center* software, the app lets you play DVDs, TV, radio, and view any pictures or video saved on your PC. It's a good idea, but the software is glitchy and unreliable; our system occasionally locked up while we used the software. Even worse, the redesigned slim remote control exhibits poor range and response.

The MEGA 865 is based on an Intel 865G chipset that offers a single SATA port, dual-channel RAM support, and compatibility with most P4 CPUs with bus speeds up to 800MHz. Building the MEGA 865 can get a little tight compared with more spacious SFF designs. Getting the videocard into the AGP slot, for example, proved difficult and frustrating; we had to jam the card right into the wiring bundle to get it to fit.

A pretty front panel is one of the MEGA's most charming features.

As a multimedia box, the MEGA 865 is on the right track. There are four-pin and six-pin front-mounted FireWire ports, USB 2.0 ports, and both headphone and mic jacks up front. It's too bad the buggy *Media Center III* software and shoddy remote performance render the experience less than optimal. Here's hoping that the third-generation MEGA will get everything just right.

—GORDON MAH UNG

MAXIMUM PC VERDICT 7

+ FAT ALBERT
Sweet look and integrated radio.

– RERUN
Media Center software is bug-infested.

$310, www.msicomputer.com

Antec Aria

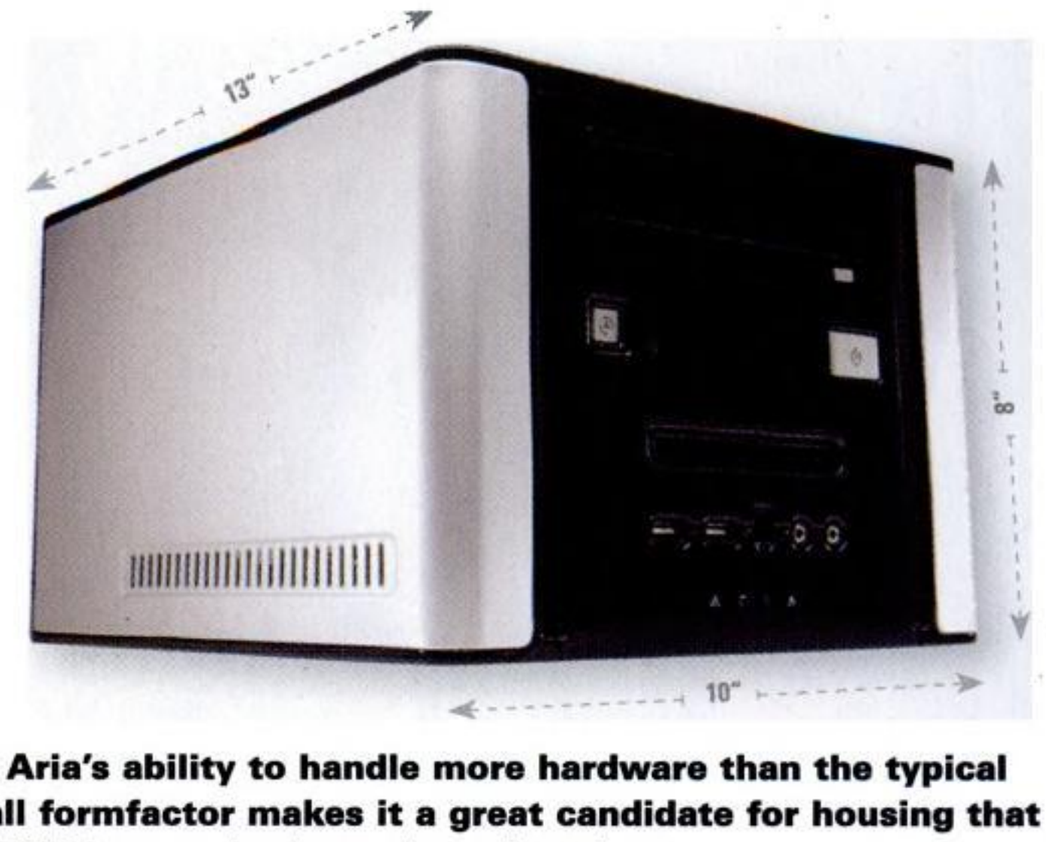
This spacious small formfactor case invites you to BYOM: bring your own mobo

In anticipation of ATI's HD All-in-Wonder, we've been kicking around the idea of building the ultimate HD PVR home entertainment PC. We'd obviously prefer to house our system in a box that will sit discretely in a living room environment, but small formfactor PCs typically limit you to a single hard drive and PCI slot—and a proper HD PVR system needs more.

Enter Antec's new Aria enclosure. About the size of a double Delonghi toaster, the Aria is similar to other small formfactor boxes with a couple notable exceptions. For starters, you provide the Micro ATX mobo. Sure it's a little more work on your part, but in return you have more say regarding features. What's more, the Aria's drive cage lets you mount three hard drives—two vertically, and one horizontally—a bounty previously unheard of in an SFF case.

The Aria is solidly built and easy to work on. Simply remove the top cover, pop off the two side panels and you have unfettered access to the innards. Even better, the cage that holds the optical drives and hard drives flips out, so you don't have to unscrew anything. With a full-length optical drive mounted in the cage, the clearance between it and the power supply can be a bit tight, but it fits, and with optical drives getting shorter, space is even less an issue. The box is powered by an Antec-branded 300-watt PSU equipped with a 120mm fan.

In respect to home entertainment usage, the Aria comes with a built-in 8-in-1 media reader that connects to an internal USB header on a motherboard, as well as a set of USB, FireWire, and audio ports. Of course, this requires that the mobo you select has corresponding headers for these ports. Finding a decent Micro ATX board can be a chore, which makes it all the more surprising that Antec doesn't recommend any compatible makes and models in the documentation. (As of press time, the company had still not responded to our request for a recommendation.)



The Aria's ability to handle more hardware than the typical small formfactor makes it a great candidate for housing that HD PVR box you've been dreaming about.

Still, we can't help but drool when we think of the compact Aria stuffed with three 400GB Hitachi hard drives, a SATA controller card, an All-in-Wonder Radeon 9800, a Sound Blaster Audigy 2 ZS, an HD All-In-Wonder, and a dual-layer burner.

—GORDON MAH UNG

MAXIMUM PC VERDICT 9

+ ARIA
The big 120mm fan makes it a cool machine.

– KARAOKE
Matching a mobo to the Aria requires some research.

$120, www.antec-inc.com

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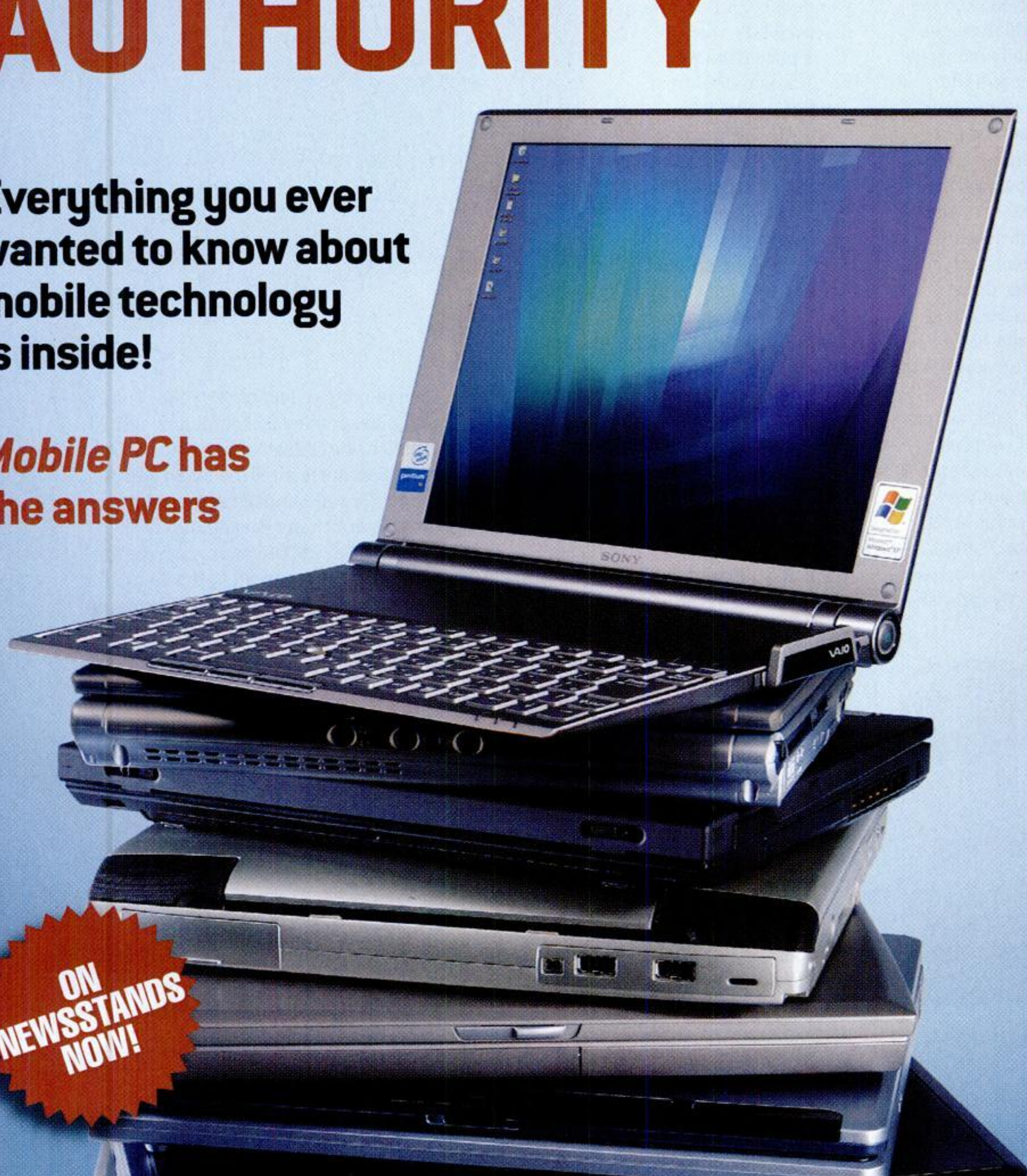

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future network usa
Media with Passion

Asus MyPal A620BT

A FAST AND WELL-CONNECTED FRIEND

Geeks and gearheads have a passion for high-performance machines, tweaking their gadgets in every way possible to squeeze out those extra nanoseconds. The folks at Asus, known for making excellent PC motherboards, share that passion and released the MyPal A620BT PDA to prove it. With its sizzling performance, bright screen, Bluetooth, and long battery life, you may want to make the MyPal your pal, too.

A quick look at the MyPal says nothing of the outstanding performer within. Its plastic casing has the familiar brushed-aluminum look of many Pocket PCs, but there are a few differences. The record button is on the top rather than the side, which makes it less likely to be accidentally punched as you pull the device from your pocket. The other big difference is the CompactFlash slot. Newer Secure Digital slots are now much more common and arguably better than CF, so it's surprising that Asus has gone with the older media type. The slot has a removable panel, so it can accommodate larger CF add-in modules.

★★★★☆

BEST FEATURE Record-breaking performance

WORST FEATURE CompactFlash slot instead of SD

The A620BT is thin and light, at just 4.9 x 3.2 x 0.5 inches and 5 ounces. Asus claims that it's the smallest and lightest PDA with a CF slot, but we found that it weighed the same as an HP iPaq h2200, which is smaller but thicker. At any rate, the Asus is compact and pocketable — particularly for a CF handheld. So if you're looking to maintain your collection of CF cards and peripherals, this is the PDA for you.

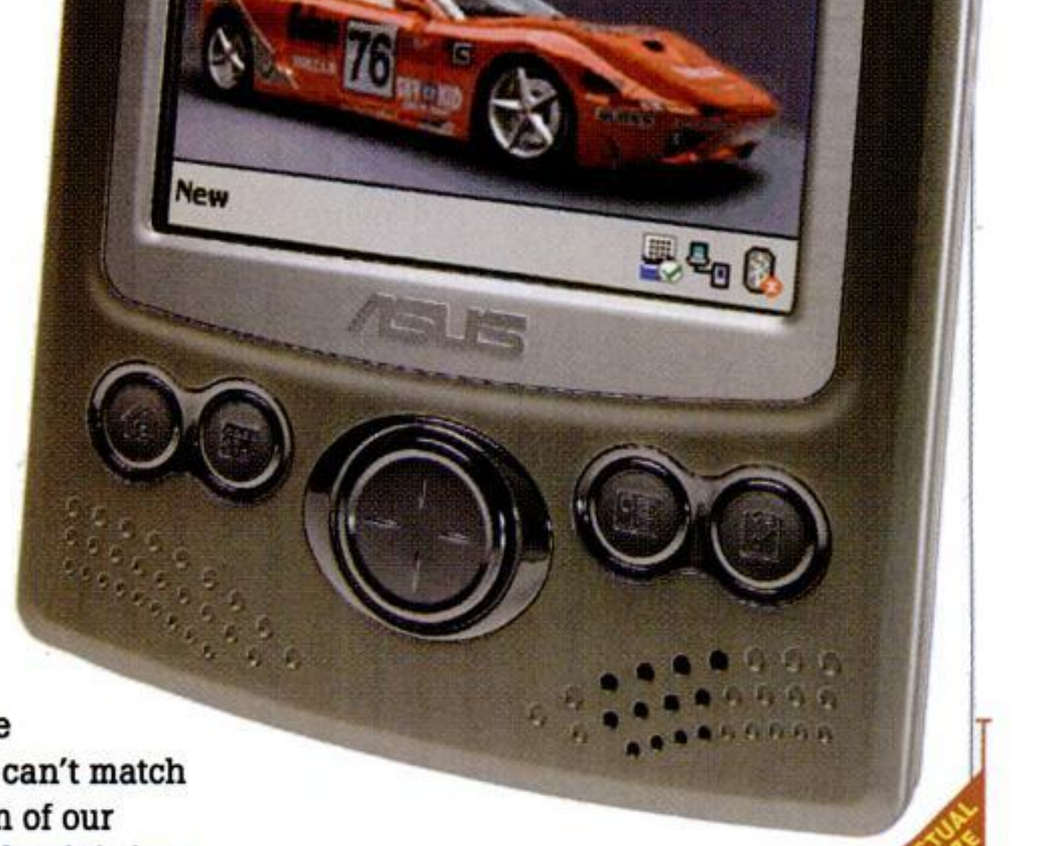
In most respects, the MyPal is a midrange to high-end Pocket PC. Its 400MHz Intel XScale PXA255 processor is near the top of the line, but its 64MB of RAM is average. However, it does have about 32MB of free nonvolatile flash memory for backing up your contacts database and other important data. While it can't boast high-speed Wi-Fi, the A620BT does have Bluetooth to differentiate it from lowlier Pocket PCs.

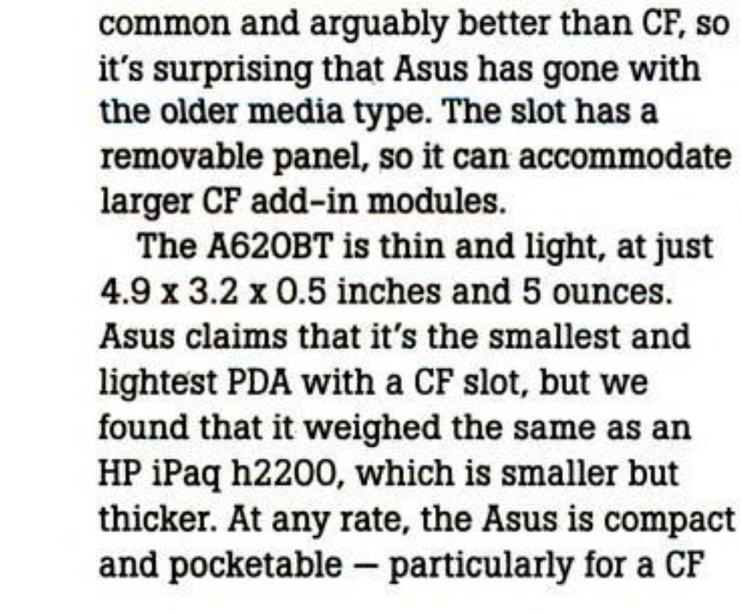
The MyPal is a true friend to the eyes and ears. The 320 x 240-pixel, transflective TFT offers up the standard 65,536 colors, but it is quite bright and high contrast. It can't match the higher resolution screen of our favorite, the Toshiba e805, but it is just as bright and easy to read. And though the integrated speaker is weak, the unit sounds great with headphones on. At its maximum volume, music verges on painful, just as it should.

Asus ships two software discs with the device, but there's not really much on them. One has the typical set of Outlook 2002 and ActiveSync 3.7 and links to AvantGo. The other includes Pocket PC themes, some free software, and game downloads. Of these, the best are IA Presenter, IA Album, and IA Zip (a WinZip-compatible compression utility). The most memorable game is *Dung Cleaner,* a *Lode-Runner* clone in which you dig holes to evade your pursuers and collect, well, dung.

Showing off in our performance tests, the MyPal systematically bludgeoned the competition in our benchmark tests. With a record-setting Spb Benchmark score of 1,691, the Asus was yards ahead of its closest competitor, the HP iPaq h4150. Battery life was also excellent, though not the best we've seen. The unit played video for four hours and 20 minutes, and it lasted for another hour and 15 minutes after the video stopped. But that's still better than most Palm devices and many Pocket PCs.

The MyPal A620BT may not have the most extensive spec set in the world, but in the end it's all about the performance. Asus could have made this product wholly irresistible had it included an SD slot and Wi-Fi, but it's still a lot of PDA for $399. *–Roger Hibbert*





A removable cover 1 offers easy access to the CompactFlash slot 2.

Asus MyPal A620BT **$399**

Weight: 5 ounces | **Size:** 4.9 x 3.2 x 0.5 inches

Specs: 400MHz XScale processor; 64MB of RAM; 64MB of ROM; 3.5-inch 320 x 240-pixel TFT; Bluetooth; CF slot; lithium-ion battery; Windows Mobile 2003

www.asus.com

PERFORMANCE

	WORST		BEST
Spb Benchmark	708	1,691	1,691
Battery life (hours)	2:16	5:35	12:07

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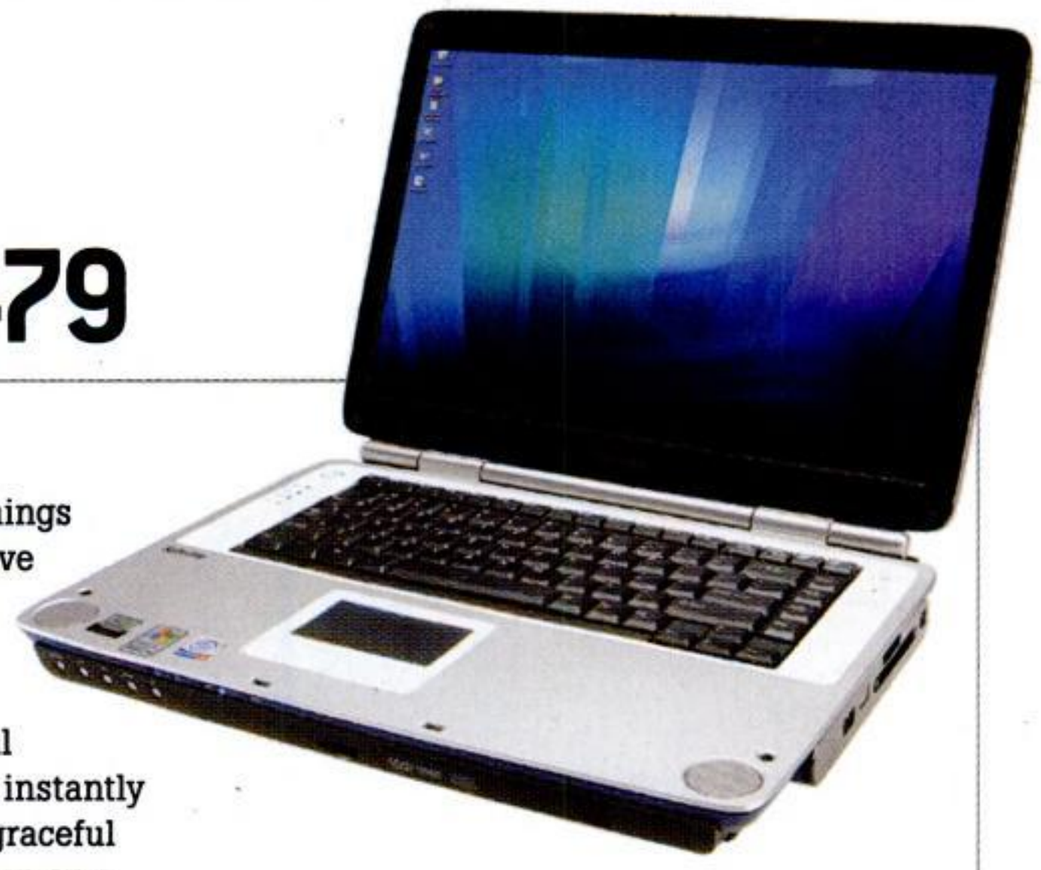
Toshiba Satellite P15-S479

THE PORTABLE HOME THEATER



The Toshiba Satellite P25 is a 10-pound hulk of a computer, a 17-inch widescreen that impresses with its thoughtful design, modern styling, and serious under-the-hood specs. Think of the P15 as the junior-varsity version.

Weighing in at 8 pounds on the nose, the P15's only noticeable difference is a slightly smaller screen, at 15.4 inches. The other features of the P25 are there, only less space is wasted on either side of the keyboard. All things considered, we'd rather have the slightly more compact version, which costs up to $1,000 less.

The Satellite P15 is a real computing showpiece that instantly gets people talking. More graceful curves have never been seen on a notebook computer, and the P15's booming speakers, gorgeous screen, and impressive keyboard all back up its thoughtful design. Under the hood, the Satellite is no slouch; while gaming performance could stand to be improved, the obvious tradeoff for an older Nvidia graphics card was made to keep the price down (hitting an irresistible $1,799).

More than just a notebook, the P15 is also a Windows Media Center PC, with a built-in TV tuner and remote control. As with all Media Center machines, this notebook doubles as a TiVo-style video recorder — and believe us, video looks far better on the Toshiba's screen than it does on most traditional CRTs.

With two hours and 42 minutes of battery life, daredevils might even take a stab at lugging the P15 along on a trip. You may not be comfortable trying to open the notebook in coach, but if nothing else, you're sure to impress the pants off the guy in the seat next to you.
–Christopher Null

PERFORMANCE

	WORST		BEST
Sysmark	78	179	218
Unreal	9.6	90.7	211.1
Battery	1:02	2:42	5:21

★★★★☆

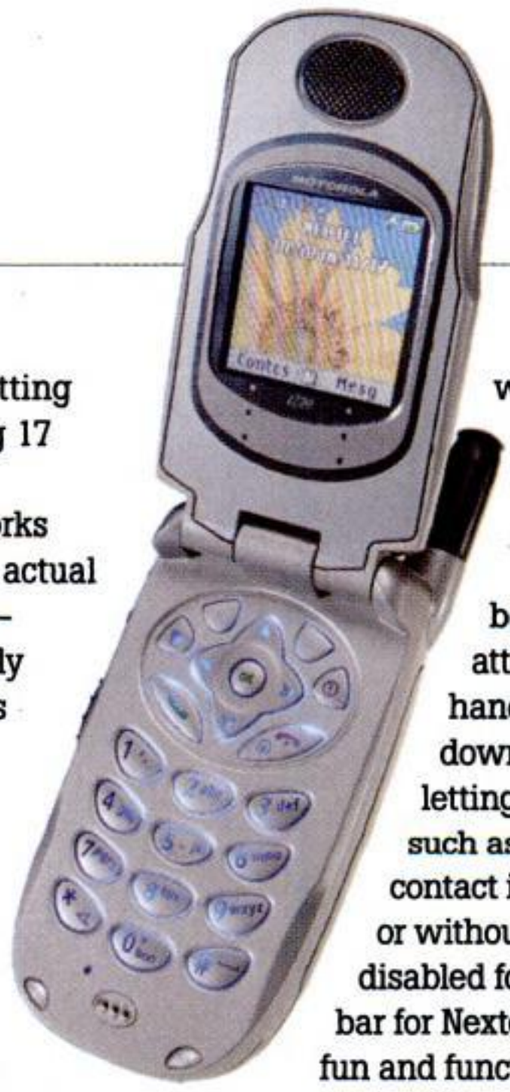
BEST FEATURE Outstanding audio and video experience

WORST FEATURE Gaming performance a little weak

Toshiba Satellite P15-S479	$1,799
Weight: 8.0 pounds	**Size:** 13 x 10.8 x 1.2 inches
Specs: 2.8GHz Pentium 4; 64MB Nvidia GeForce FX Go5200; 512MB of RAM; 15.4-inch TFT; 60GB hard drive; CD-RW/DVD-RW/DVD-RAM drive; SD slot; 802.11g; Windows XP Media Center	
www.toshiba.com	

Motorola i730

BIG BROTHER'S FAVORITE CELL PHONE



The world has waited years for the development of e911, the location-based emergency service that promises to save lives through the cellular airwaves. And as it turns out, businesses may get a little boost from the service, too. Offered by Nextel, Motorola's i730 iDEN phone features GPS tracking that may soon allow your company to pinpoint your position to within 50 feet.

Nextel has offered walkie-talkie phones for years, and the i730 is the company's most advanced handset yet. With a 1.7-inch, 65,000-color screen and a large keypad, navigating the i730's menus is simpler than on most handsets. This is good, because the interface is more complicated than many conventional phones. Booting takes a good 20 seconds, and shutting it down takes a dismaying 17 seconds.

Fortunately, the i730 works much more quickly during actual use. Establishing a walkie-talkie connection takes only a few seconds, even across thousands of miles. Data connections through the WAP browser are peppy, and the phone supports AOL mail and AOL Instant Messenger so that you can keep in touch with your buddies on the road.

Being a walkie-talkie phone, the i730 has an excellent speakerphone mode that sounded great — on both sides of the conversation — in our tests. It also supports voice-activated dialing and doubles as a voice recorder for logging short memos or capturing important conversations. But watch out: with a talk time of 3 hours and 22 minutes, all these extra features may shut you down prematurely.

As difficult as it may be to convince your flight attendants, the i730 features a handy airplane mode that shuts down its wireless features while letting you access important things such as date book entries, memos, contact information, and games. With or without GPS tracking, which can be disabled for privacy, the i730 raises the bar for Nextel handsets and brings all the fun and functionality of an afterhours cell phone to the long-trusted Direct Connect network Nextel made famous.
–Robert Strohmeyer

★★★★☆

BEST FEATURE Zippy push-to-talk service

WORST FEATURE Extremely bulky for a flip phone

Motorola i730	$299
Weight: 5.1 ounces	**Size:** 3.6 x 2.0 x 1.1 inches
Specs: iDEN; Direct Connect; GPS; WAP; Java; speakerphone; voice dialing	
www.nextel.com	

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CMS Velocity 200GB External SATA Drive

It's like having an internal drive outside your PC!

With Serial ATA's blazing-fast transfer speeds and hot-swapping skills, it has the potential to steal the show from the current crop of USB and FireWire backup drives. Take for example CMS' Velocity drive, the world's first SATA external drive. It is one *smokin'* mutha.

In other words, it's just as fast as a top-of-the-line internal SATA drive, which makes perfect sense as it connects to an internal SATA port on your motherboard or a PCI add-in card. The drive includes a pass-through adapter that fits into an empty slot hole on your PC case; a cable connects the pass-through adapter to an internal SATA port on one end, and a second cable connects the pass-through to the external drive. A 200GB Maxtor drive with an 8MB buffer and a 7,200rpm rotational velocity comes wrapped in the silver plastic that adorns almost every external ATA backup drive on the market these days. And—big surprise—the CMS Velocity features blue LEDs, one for power, one for activity.

Although the Serial ATA 1.0 spec doesn't "officially" allow for external usage, CMS blazes a path with the first external SATA drive on the market. A pass-through adapter (pictured on the left) lets you attach the drive to your mobo.

During testing, the drive ran lickety-split and demonstrated access times that were remarkably faster than its USB/FireWire brethren, which makes the backup process a heckuva lot faster. And because this is a SATA drive, you can clone your primary drive to it and boot off the external drive if your primary ever fails. Indeed, this is the only "real" advantage to using the SATA interface. Because you need the pass-through adapter to move the drive to another computer, it's not super portable.

Backup duties are performed by *BounceBack Express,* a decent backup utility. It has all the features of more sophisticated backup programs, but its interface is a little unwieldy. For example, rather than being able to perform several different backup tasks from a single interface, the program divvies all its functions into several different mini-apps. It's not that big an inconvenience—a quick launch applet resides in the system tray—but it's still annoying.

Our other gripe is the CMS drive's price: A $550 MSRP (street is about $100 less) is damn expensive. For that kind of money we'd rather have a 400GB Hitachi Deskstar as an internal backup drive—it's twice as big and just as portable.

—JOSH NOREM

MAXIMUM PC VERDICT 8

+ SILVER

Very fast, on the cusp of technology, easy to use.

– SLIVER

Pricey, and software is a tad unintuitive.

$550, www.cmsproducts.com

Seagate External USB/FireWire 160GB Drive

A streamlined approach to storage that doesn't cost an arm and a leg

Seagate's external drive is a backup workhorse that trades bells and whistles for good old-fashioned simplicity.

Unlike the Western Digital Media Center we reviewed last month or the Serial ATA backup drive reviewed above, this Seagate backup drive doesn't have any fancy specs. It's sort of like a German shepherd police dog that doesn't talk or drive cars—it performs capably, but there are clearly more talented dogs in Hollywood. Is that a bad thing? We don't think so, particularly because while the Seagate drive is smaller than other drives we've tested, it's also the most affordable backup drive on the market.

Let's take a look at the package. Housed inside the silver plastic shell is a 160GB Seagate drive that spins its little platters at 7,200rpm. It packs an 8MB buffer and includes a USB 2.0 interface as well as dual FireWire ports for daisy-chaining. The drive comes with an optional vertical stand and features a rubber ring on top that accommodates the piggy-backing of an additional Seagate external drive (it also makes a great CD holder). The front of the drive features a single button that triggers a pre-selected backup routine, as well as two orange lights for power and activity. A power switch resides on the drive's rear, though you won't need to turn it off as it's virtually silent.

Like the SATA drive reviewed above, Seagate's drive uses *BounceBack Express* for backup duties. In case you didn't read the other review—shame on you!—we'll repeat that it's a capable software package, if a bit unintuitive.

In lab tests, we experienced zero problems with the hardware, but had one small issue with the software. Even after performing our first backup to the Seagate drive, the push-button backup wouldn't work because the software kept failing to recognize the drive.

Overall, this is a good choice for price-conscious folks. It's not as big or as sophisticated as other drives on the market, but it does what it's supposed to with relative ease, and the USB/FireWire interfaces make it compatible with most PCs and Macs in existence.

—JOSH NOREM

MAXIMUM PC VERDICT 8

+ PUPPIES

Covers all the bases, is affordable, and sports a sleek exterior.

– YUPPIES

Software is not intuitive.

$250, www.seagate.com

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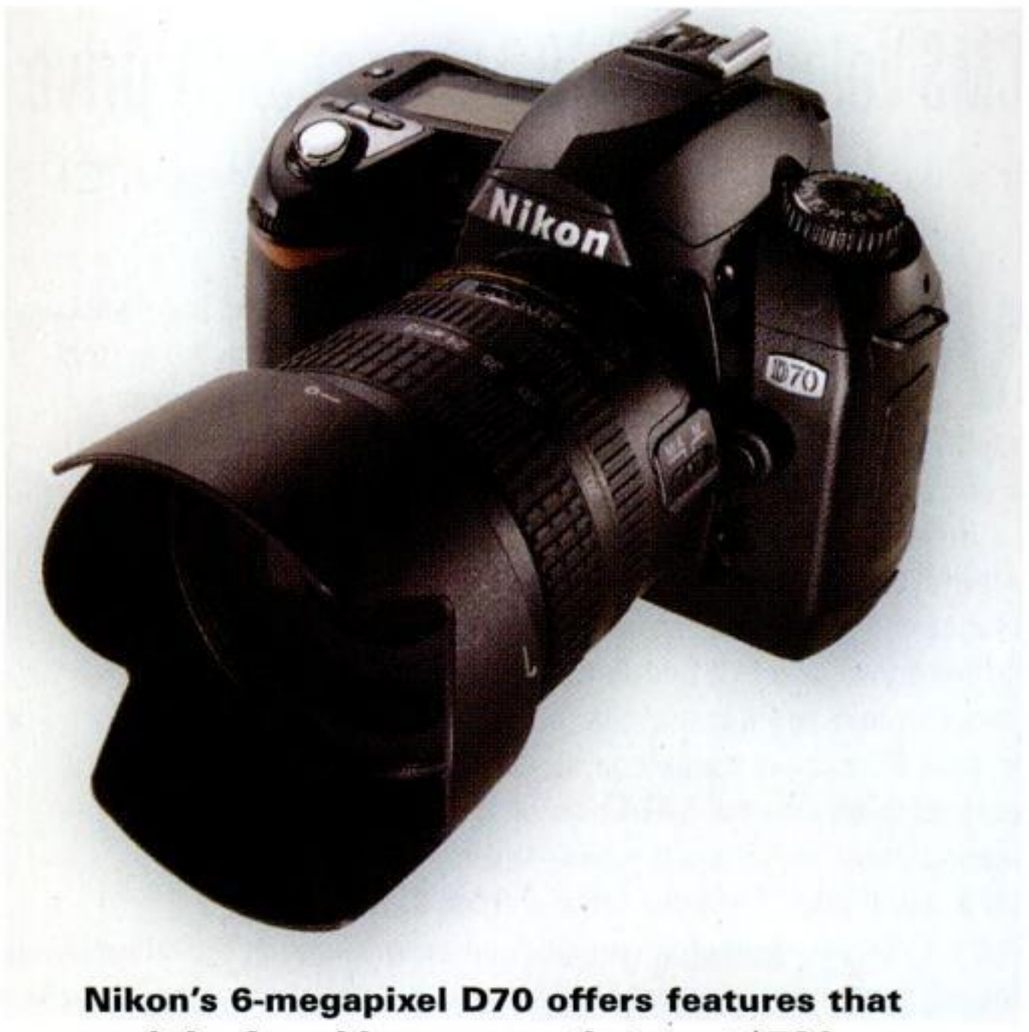
Nikon D70

The newest budget digital SLR on the market rocks the competition with high resolutions and fast write speeds



Nikon's 6-megapixel D70 offers features that can't be found in cameras that cost $500 more.

Nikon's new D70 digital SLR body should have cost-conscious F-mount fans doing cartwheels. This hot new digicam puts to rest any nagging fears that the company had simply given up to Canon. At $1,000 for the body, which is plastic yet sturdy, the D70 is an amazing tool with many features that outstrip cameras costing $500 more.

Among the camera's most impressive attributes is its buffering ability. Use a high-speed CF card, set the D70 to "normal" quality (1:8 JPEG compression versus 1:4), and you can hold down the shutter release until the Compact Flash card fills up at 3 frames per second with no slowdown. Every other digital SLR on the market (including more expensive professional models) bogs down after the buffer's been filled, but not the D70. Nikon says you can shoot about 144 photos before the camera slows down, but we were able to capture more than 150 images at the "fine" setting.

But the D70 isn't just about machine-gun photography. It's also an excellent 6.1 megapixel camera. Nikon won't disclose who makes the sensors for its digital SLRs but the D70's imager offers noiseless, nicely saturated pictures at low ISOs. We did find, however, that as the ISO ramps up to 1600, the noise—similar to graininess in high-speed film—became more pronounced. While far cleaner than most 1600 speed films, the CCD imager is definitely inferior to the CMOS sensors used in Canon's digital SLR cameras.

More troubling to us are the moiré patterns that appear in images produced by the D70. Moiré patterns occur when a fine pattern, like a row of houses, or even a tweed jacket, interacts with the fine mesh of photoreceptors in a camera, resulting in a series of colored bands in photographs. Most digital cameras exhibit some moiré at times, but with the D70, it's more noticeable. In fact, we found the D70's moiré patterns to be far worse than those of the Canon EOS 10D in side-by-side comparisons.

But is the moiré issue a deal breaker? We asked our own staff photographers, both Nikon shooters, and got a split opinion. One said she definitely couldn't live with it, while the other said that if he were a vested Nikon user on a budget, he could accept the moiré. Realistically speaking, the moiré patterns will show up in just a small percentage of shots, and then only at high-magnification, so it's excusable as far as we're concerned. That said, image freaks might do well to wait a month or two in case Nikon resolves the problem.

While the D70 can't beat the competition in moiré, it's got the edge in user tweaks. Canon's Digital Rebel broke new ground by being the first digital SLR for less than $1,000. To get there, though, Canon gutted most of the advanced features and tweaks. Nikon took the opposite tact, giving budget users additional control. If you want the camera to, say, switch to a higher ISO speed when you hit 1/30 of a second instead of 1/60, you can do that. The D70's electro/mechanical shutter also lets the camera sync at 1/500 of a second. This lets you shoot with a flash at higher shutter speeds.

A nagging concern we have with the D70 is the occurrence of excessive moiré patterns, as seen on the roof tops behind the power line.

The D70's focusing capabilities are another story. The focus point system—borrowed from Nikon's $250 film SLRs—is hard to read, a flaw that's compounded by the viewfinder's smaller-than-average size. Furthermore, the D70 doesn't let you change focus modes without digging into the menu.

Still, these are minor nitpicks. We were prepared to give the D70 a Kick Ass award, as it truly whoops the competition in feature set, but the moiré issue tempered our enthusiasm. We'll revisit the D70 down the road to see if the matter has been corrected.

—GORDON MAH UNG

SPECS

Sensor	6.1MP (3008x2000) CCD imager
Metering	1005 pixel color meter with matrix metering, variable center weighted metering (75 percent with adjustable diameter circle), 1 percent spot metering
Drive	3 fps for 144 exposures using high-speed media (tested beyond 144 by staff)
Flash	Built-in with 1/500 sync and support for wireless i-TTL with SB600 flash units
ISO range	200-1600
Storage	Compact Flash Type I and Type II with FAT32 support

MAXIMUM PC VERDICT 9

+ VELVIA

Incredibly fast performance and 1/500 sync speed.

– VELVEETA

Noticeable moiré, and unable to easily change autofocus modes.

$1,000 body only ($1,300 with 18-70mm F/3.5-4.5 lens), www.nikonusa.com

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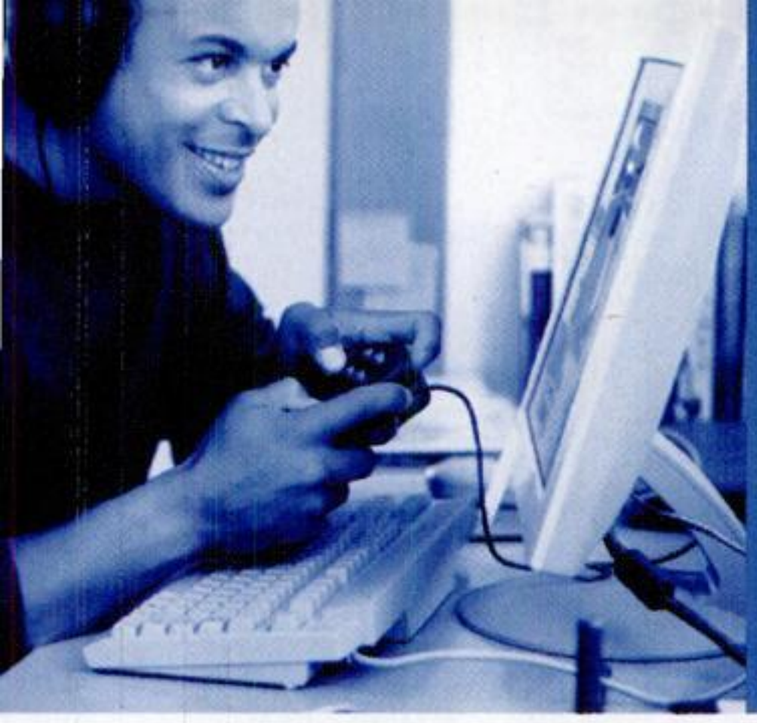

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LCD Love It or Leave It

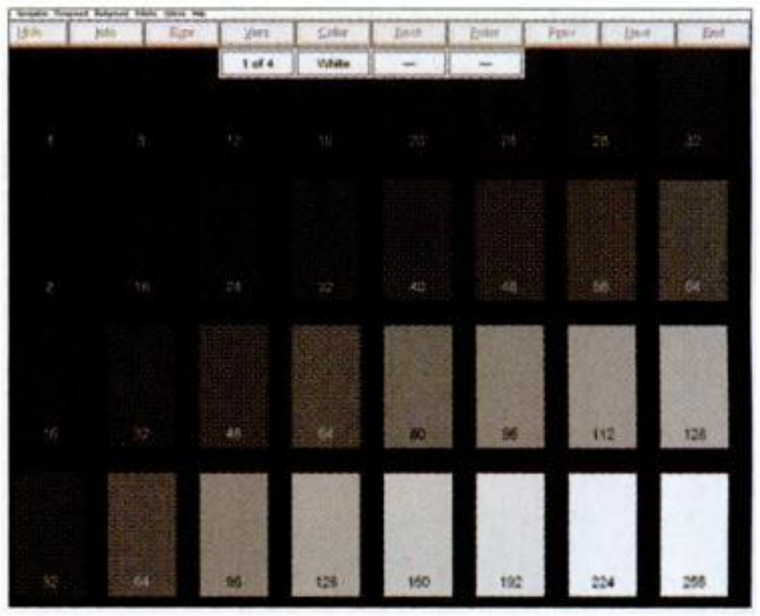
Three LCD monitors that are good for games show us what else they're made of

In last month's Maximum PC Challenge we set out to test whether today's LCD monitors are as unsuitable for gaming as their predecessors, which tended to suffer image-quality flaws when displaying fast-moving content. Our findings proved pleasantly surprising. Of the Challenge's eight test subjects (LCDs culled from the recent offerings of leading manufacturers), three passed the stringent qualifications of our expert panel of editors, proving themselves fit for today's popular 3D titles.

But loath as we are to admit it, a PC geek can't live on games alone. So this month Planar's PL170, Samsung's 172X, and Dell's 2001FP advance to the finals to determine which is the all-around champion.

—KATHERINE STEVENSON

The 172X's handsome folding base allows the monitor to sit atop a desk or be mounted to a wall.



***DisplayMate's* grayscale tests are important indicators of how an LCD monitor resolves subtle differences in tone and color. In this screen, for instance, it's ideal if you can distinguish between the darkest gray box and the black background.**

Planar PL170

The 17-inch PL170 was the least expensive of all of last month's challengers, and one of just two that sported a VGA-only interface, so it's a triumph simply that it's come this far. The PL170's appearance is unassuming, to be sure. The plain black (or white) plastic chassis is nothing to write home about, but also utterly inoffensive. The five black control buttons on the monitor's frame are so low-profile as to be difficult to see and ambiguously labeled. And the PL170 won't win any contests with its adjustability, as it is able to tilt just slightly forward and back on its base, but that's it.

Planar's decision to make the PL170 VGA-only was tantamount to throwing in the towel.

For image-quality tests, we turn to our standard ally *DisplayMate*, a compilation of various test screens designed to expose a monitor's worst, or hidden, flaws. Whereas our game tests of last month were focused on issues of ghosting, interpolation, and color-contrast in action-packed graphics, *DisplayMate* isolates specific qualities in a way real-world apps can't. For instance, when looking at a graduated series of gray boxes against both white and black backgrounds on the PL170, we had trouble distinguishing subtleties at the extreme ends of the scale. In other words, very light grays looked white, and very dark grays look black, though not to any degree that would make it unusable for most applications other than image editing.

It's quite likely the PL170 is handicapped by its VGA interface. After all, the analog conversion inherent in VGA LCDs introduces an additional abstraction layer that the DVI-ready Samsung and Dell monitors don't have to mess with. This distinction was most obvious in the *DisplayMate* screen that tests video noise. A screen that should have appeared absolutely stationary showed distinct noise on the PL170, though we were able to minimize the noise via the Auto Adjust setting. We also noticed obvious vertical banding on the PL170 when looking at swaths of continuously graduated color, particularly at the dark ends of the color spectrum.

Serif text was comfortably legible at 9-point and greater, on both dark and light backgrounds, but appeared a tad fuzzier than the text on the other two monitors—another shortcoming we attribute to the PL170's analog signal.

PL170

MAXIMUM PC VERDICT 8

SEEING

Inexpensive, good gaming performance, acceptable image quality for most applications.

SEETHING

VGA interface, inflexible neck, banding problems in *DisplayMate*.

$460, www.planar.com

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Samsung SyncMaster 172X

The 172X is roughly the same size and shape as Planar's PL170, but decidedly more sophisticated with its brushed-aluminum shell and multi-purpose stand. The 172X can either sit on a desktop where its hinged base allows forward and backward tilting action and minimal height-adjustment, or it can be mounted on a wall, where the hinge serves to pull the screen a couple inches out toward the user for closer viewing. The monitor also comes with an chair-arm mount option. Of course, the 172X's fancier stylings make it heavier than the Planar, but not by much. Samsung touts the 172X's "hidden controls," which reside on the underside of the monitor's frame, but we prefer to have our buttons in plain view, where we can easily see what we're pushing. We have a more favorable opinion of the 172X's "hidden cable system," which confines all cables to a dock of easily accessible ports at the back of the monitor's base, and indeed makes for a comparatively cleaner look.

In our *DisplayMate* tests the 172X consistently performed a notch above the PL170. Subtle differences in grayscales were more evident and video noise was nonexistent. The 172X showed slight banding in screens of continuous graduated color, but the anomaly was isolated to just one or two areas of the display, and only at the darker ends of the color spectrum. Keep in mind that banding may never even appear in real-world content.

As an added bonus, the 172X features Samsung's patented MagicBright technology. Accessible via one of the six buttons on the monitor's control panel, MagicBright is essentially a shortcut to fiddling with the other control panel buttons. Simply choose the Text, Internet, or Entertainment option for a setting that has theoretically been optimized for that particular type of content.

Times New Roman text was comfortably legible at 9 point, and looked pretty good all around.

SyncMaster 172X

MAXIMUM PC VERDICT 9

DISPLAY

Stylish frame, satisfying *DisplayMate* performance, good for gaming.

DISMAY

Limited height adjustment, "hidden controls."

$650, www.samsung.com

Not only is the 2001FP good for games—it's got the features and performance to prove it means business.

Dell UltraSharp 2001FP

On the surface, the 2001FP clearly has the edge. It's got a generous 20.1-inch viewable area with a 1600x1200 resolution, a handsome midnight-gray enclosure with silver accents, and an ultra-flexible neck that lets you not only tilt the screen forward and back, but rotate it to a portrait orientation (any videocard worth owning will let you configure the content on your display accordingly). Another benefit of the 2001FP's physical agility is that you can easily access the bounty of inputs that reside on the monitor's underside: DVI, VGA, S-Video, and Composite-Video—all at your disposal and ready to accept a variety of video signals. A picture-in-picture option lets you watch content from two different video sources—say, your PC and a TV—at the same time. Furthermore, the 2001FP can double as a four-port USB hub as long as it's connected to a USB port on your PC.

DisplayMate was the 2001FP's final hurdle. Here, Dell's monitor fared somewhere between the VGA-only PL170 and Samsung's 172X in the app's highly exacting test scripts. On the grayscale ramps, the 2001FP had more trouble at the darker end of the spectrum, where subtle differences in tone were harder to discern than at the lighter end. But, overall, the 2001FP performed well and text reproduction was laudable even in a serif font. In other words, we feel confident recommending this monitor for the vast majority of desktop chores.

With all of the 2001FP's fine features, its proven ability to withstand the rigors of gaming, and a reasonable price tag for its size, it's an undeniable value for desktop users and an obvious winner in our book.

UltraSharp 2001FP

MAXIMUM PC VERDICT 9

SCREEN

Functional design, nice big screen, good gaming performance.

SCREAM

Less-than-perfect resolution of dark grays against a black background.

$900, www.dell.com

THE SPECS	PLANAR	SAMSUNG	DELL
Viewable area	17-inch	17-inch	20.1-inch
Native resolution	1280x1024	1280x1024	1600x1200
Pixel pitch	0.26mm	0.29mm	0.26mm
Interface	VGA	VGA, DVI	VGA, DVI, S-Video, Composite-Video

Copyrighted material

Headset Hostilities

Built for multiplayer gaming, these two USB headsets will leave you talking while you play

Thanks to the growing availability of broadband connections and the increasing complexity of online gaming, real-time voice chat has become a viable and often necessary means of communicating with your teammates and victims alike in popular online titles such as *CounterStrike* and *Unreal Tournament 2004*. This month, we take a look at a pair of USB headsets that promise to add an extra layer of immersion to your gaming experience.

—TAE KIM

Plantronics DSP-500

Allow us to borrow a sentiment from Jeff Foxworthy, the king of redneck jokes: If you work in an office or own a cell phone and you use a headset, you're probably a Plantronics user. Such a generalization is possible, what with the California-based company being an industry-leading headset manufacturer. And thanks to the amazing DSP-500 headset, you can add gamers to the list of likely Plantronics customers as well.

With high-quality sound and comfy ear cushions, the Plantronics DSP-500 has everything we look for in a gaming headset

The DSP-500 looks nothing like the headsets donned by secretaries and telemarketers around the globe. Instead, it looks and sounds more like a pair of high-end stereo headphones. That's a good thing. We were further impressed by the DSP-500's audio performance in our gaming tests, and it's no wonder: The unit is powered by a pair of large 40mm speakers and features a built-in hardware digital signal processor for added performance and extra "oomph." And the DSP-500 sounds just as impressive playing music as it does playing games.

Thanks to its soft ear cushions, the DSP-500 is also incredibly comfortable; we wore it through several extended gaming sessions without feeling any outer ear-pain. Communication was pain-free thanks to the attached boom mic's reliable voice recognition and response.

The only fault we could find was with the DSP hardware housing: It comes attached directly to the headset cord and can be a bit unwieldy. But, that said, we'd gladly recommend the DSP-500 to any gamer in the market for a quality gaming headset.

Plantronics DSP-500

MAXIMUM PC VERDICT 9

+ ROBERT PLANT

Built-in DSP, impressive performance, and comfortable to use.

– SEWAGE PLANT

DSP housing is slightly cumbersome.

$110, www.plantronics.com

Logitech Stereo USB 300 Headset

Logitech is a familiar name to most gamers: From keyboards and mice to game controllers and speakers, the company manufactures PC peripherals for almost every gaming-related need. But while many Logitech products rank among the best in their respective categories, the Stereo USB 300 headset can't claim this distinction.

Our biggest complaint is that the USB 300 lacks bass response. The modestly sized speakers managed some impressive audio performance in our gaming tests, but couldn't produce enough bass to satisfy our expert ears. Bottom-heavy effects like explosions and machine gun fire sounded muffled and distant unless we were perilously close to the source.

The Logitech Stereo USB 300 delivers adequate performance but has trouble reproducing bass notes.

The USB 300's saving grace is its microphone; it offers impressive voice recognition and response. However, at high input levels, the mic is incredibly sensitive and prone to transmitting ambient background noise (the effect is similar to those novelty "spy" listening devices, only not as pronounced). Turning down the input levels helps alleviate this issue. Otherwise, the mic performs admirably.

We never felt completely comfortable wearing this set of USB headphones. The ear cushions are stiff and unforgiving, and require an initial breaking-in period before they can be worn for extended periods of time. As it stands, we can only recommend the USB 300 to the casual gamer who occasionally ventures online, or the budget gamer in the market for a decent midrange headset.

Logitech Stereo USB

MAXIMUM PC VERDICT 6

+ HOT CHOCOLATE

Great microphone performance and decent audio.

– VANILLA ICE

Bass response is lacking.

$50, www.logitech.com

Copyrighted material

SVC

SILICON VALLEY COMPUTER

www.svc.com

COOL PRODUCTS HOT PRICES

AEROCOOL HT-101

ATHLON/P4 CPU COOLER

The HT-101 is Aerocool's answer to the SP97 and SLK-9xx series coolers. With the included ultra quiet 22dBA fan, the HT-101 can already cool up to XP3600+. I, and can fit up to two 80mm fans. With a UV Reactive acrylic shroud and UV Reactive fan with quad UV LEDs, the HT-101 will look great in any system. Only $54.99

AEROCOOL DP-102 2004 LIMITED EDITION

INDIVIDUALLY NUMBERED
(1 through 2004)
ONLY 2004 WILL BE MADE!
(2 Free Golden Colored Fans)

The 2004 Limited Edition DP-102 is based on the award winning cooler that made a "deep impact" when it was released last year. The 2004 Limited Edition DP-102 comes equipped with two golden fans to blow away the competition, and the completely gold plated design will really stand out. Get yours now before they are all gone!
Available now for $54.99

Proud Reseller of **Aerocool** Products

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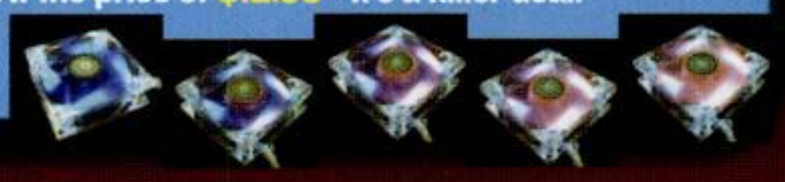
This kit allows you to build an airplane case for your computer! If you are looking for something very unique and can appreciate a challenging task, you will find great satisfaction in building the Lubic Airplane case from Aerocool. Get it now for only $129.99!

AEROCOOL CHAMELEON

Ultra Quiet Color Changing Fan

This innovative fan from Aerocool changes color from blue to pink as the temperature rises! At the price of $12.99 - it's a killer deal!



OCZ COPPER BGA

RAMSINKS/CHIPSET HEATSINKS

The OCZ Copper BGA Ramsink has been designed to provide optimal heat dissipation when used on video card memory and small system components. If you are overclocking your video card, the OCZ Copper BGA Ramsink's will help you achieve better stability and greater performance.
The easy to use thermal tape allows for proper installation without the use of messy adhesive.
Just $6.99 for a four pack!

OCZ EL DDR PC-4400

550 MHZ • GOLD EDITION • DUAL CHANNEL

OCZ Dual Channel Gold Edition PC-4400 memory is specifically designed for high frequency operation on Intel i865 and i875 chipset based motherboards through the use of OCZ HyperSpeed and ULN technology. It is capable of achieving outrageous speeds of up to 550MHZ at CL 2.5-4-4-8. Every Dual Channel Kit from OCZ is hand tested as a matched pair across a wide variety of mainboards in order to ensure flawless performance.
At only $195 for 512MB (256x2) and $390 for 1GB (512x2) dual channel kits for **the best performing ram in the world! -**
THIS CAN'T BE BEAT!

OCZ EB DDR PC-3200

400 MHZ • PLATINUM EDITION

DUAL CHANNEL

OCZ PC-3200 Platinum Edition Dual Channel DDR memory featuring Enhanced Bandwidth Technology allows for improved memory bandwidth and stability over existing PC-3200 modules. Featuring a mirrored platinum heatspreader to aid in heat dissipation - this one is available all the way up to 2GB (1GBx2) dual channel for $599, $150 for 512MB(256x2) and $285 for 1024MB(512x2).

Proud Reseller of **OCZ** High Performance Memory

OCZ TECHNOLOGY

ARCTIC COOLING VGA SILENCER REV. 3

VGA Silencer is the weapon of choice for Radeon 9500-9800 and GF3 Ti Series cards. Greatly reduced temperatures allow stable, overclocked operation of your video card. Featuring silent operation, a speed control, and direct heat exhaust through the rear of your case.
THE best performing VGA cooler!
just $12.99 with coupon code "maxpcjune"!

NEW MOUSE GRIPS

Enhance the control, feel, and look of your mouse or trackball.
Just $14.99!

PANASONIC PANAFLO FANS

The most reliable and silent case fan available.

With a fluid dynamic bearing (liquid filled), the Panaflo 12L fan offers the lowest noise per unit air flow. Available in 80, 92, and 120 mm sizes. Starting at ONLY $6.99 and up!

THERMALRIGHT SP97 SOCKET A HEATSINK

W / HEATPIPE TECHNOLOGY

Thermalright makes the best performing CPU coolers available. SVC has the lowest prices on the full line.
$38.99 for SP97 $15.99 for ALX-800.

BLACK ALIEN 32W POWERED SPEAKERS

These hot new speakers have an Alien look and produce clean sound for a reasonable price. With a full 32W RMS of power, these speakers have plenty of power and will not break up at high volume. Alien speakers feature wooden cabinets for resonance free sound and rich bass sounds! All for $39.99!!

X-BLADE DELUXE

400W MID TOWER CASE

Black metal mesh accents the case's appearance. Included are (2) 80mm blue LED case fans, (1) 120mm blue LED case fan, & a 400 ATX P4 power supply . $84.99 w/400W PSU. Also available in Red, Green, Blue, Yellow, and Silver!

Linksys WRT54GS

Proof that not all 802.11g products are created equal

The new SpeedBooster version of the Linksys WRT54G delivers significantly better performance than other wireless routers.

Outrageous claims are commonplace in the wireless networking arena. First there were "double speed" 802.11b devices that, in fact, improved performance just slightly, and only in limited circumstances. More recently, we reviewed a D-Link router that purportedly doubled 802.11g performance by bonding two channels together. That router, while superfast, wreaked havoc on neighboring Wi-Fi networks. The latest router from Linksys, the WRT54GS, boasts a 20 percent performance boost using any kind of 802.11g cards while still playing nice with your neighbors' LAN.

Does it deliver the goods? Indeed! The WRT54GS is unequivocally faster than plain-vanilla 802.11g hardware. We tested the new router in all three of its modes—802.11b-compatibility mode, mixed 802.11g/b mode, and 802.11g-only mode. As with all 802.11g products, as soon as an 802.11b device is connected to the access point, the entire network drops to the latter's puny 11Mb/s mode. But, assuming you connect only 802.11g devices to your network, Linksys' patented SpeedBooster technology grants a substantial performance increase over a typical 802.11g network. For example, the D-Link AirPlus Extreme G that we reviewed in January managed a measly 1.27MB/s in standard mode, while knocking out 2.7MB/s in its proprietary channel-bonded mode. By contrast, the WRT54GS managed to transfer a 461MB file from a wired PC to a wireless PC in a little less than 170 seconds—a transfer rate of about 2.7MB/s—in normal 802.11g mode.

BENCHMARKS

Wired to wireless	170 seconds
Wireless to wired	199 seconds

All tests are run in the 802.11g exclusive mode. To test, we measured the length of time it takes to copy a 461MB file from a wired machine to a wireless machine, and then how long it takes to copy the same file from the wireless machine back to the wired machine.

How does Linksys do it? On a typical 802.11g connection, your computer uses almost half the available bandwidth for error correction and other housekeeping tasks. With the WRT54GS, Linksys greatly reduced the overhead of these management packets, which in turn increases the Wi-Fi performance, even when using non-Linksys 802.11g devices.

We're surprised that this new functionality is available only by purchasing new hardware, as opposed to being firmware upgradeable for existing WRT54G-based routers. Still, anyone who frequently transfers large files across a wireless LAN will enjoy this router's performance.

—WILL SMITH

MAXIMUM PC VERDICT 9

+ WOOKIES

Lightning-fast 802.11g performance, without borking your neighbors' network.

– BOOKIES

No reason to upgrade from your existing 802.11b or 802.11g if you use Wi-Fi solely to share broadband.

$100, www.linksys.com

Corinex Powerline Router

No network at all is better than running Ethernet through your power lines

Networking using this Corinex HomePlug router is only marginally faster than a 14.4 modem.

Once upon a time, a *Maximum PC* editor sat in a trade-show conference room listening to two very enthusiastic representatives tout HomePlug power line networking as the Next Big Thing. The year was 1999. Five years later, we've finally received an actual product using the HomePlug spec—the Corinex Powerline Router—and boy-howdy has it not been worth the wait.

The big problem with the HomePlug spec is bandwidth. With a maximum rating of 14Mb/s, HomePlug is only marginally faster than old 802.11b Wi-Fi networks. Put another way, the Linksys Wi-Fi router reviewed above transferred data at a rate about 60 times faster than the Corinex. Ouch.

The Corinex Router is more difficult to set up and configure than wireless too. For each PC you want to connect to your power line network, you need a special adapter and a normal Ethernet card. You plug the Ethernet card into the power line adapter with a normal Ethernet cable, and then you plug the power line adapter directly into a power outlet.

The problems don't stop there. If your home has multiple circuit breaker boxes, there's a fair chance your power line network won't cover your entire home. If you want any guarantee of compatibility, you're confined to outlets that are hooked into a single breaker box. We did experience instances when a signal would jump breaker boxes, but there was no discernible rhyme or reason to make it a feature you can count on.

BENCHMARKS

Upstream	Would not run
Downstream	80 minutes

To test the Corinex Powerline Router we measured the length of time it took to transfer a 209MB video file from a machine connected via standard Ethernet to a machine on the power line network and back again.

HomePlug's final failing is its price. The Powerline Router's street price is $120, and each adapter costs $90 plus the cost of an Ethernet card. Wireless routers, on the other hand, start at around $60, with wireless cards costing about $70, and they perform eminently faster.

—WILL SMITH

MAXIMUM PC VERDICT 2

+ THE FAR SIDE

This product didn't do us physical harm, but it could have. Electricity kills.

– GENOCIDE

Slow and difficult to configure. Did we mention it's worse than wireless in every way?

$120, www.corinex.com

Copyrighted material

Hitachi 7K400 Deskstar

Four-hundred *expletive deleted* gigs of storage!

If hard drives were nations, the 400GB Deskstar would be China. And like Red China, the 7K400 rules the land of 7,200rpm drives with an iron fist.

Hitachi's all-new Deskstar 7K400 continues the company's dominance in the 7,200rpm market by not only being the fastest drive of its kind, but also the largest—by a wide margin. The jump from the 250GB 7K250 to the 400GB 7K400 was made possible by adding two platters to the drive's design, bringing the total to five aluminum platters with 10 read/write heads. But Hitachi didn't stop there. It also added a new feature dubbed Rotational Vibration Safeguard (RVS) technology that detects excessive vibration in multi-drive environments and adjusts its operation accordingly to ensure data integrity. The drive also comes with a new "latched" Serial ATA connector to ensure a stronger connection to the drive. Finally, the drive includes the now de rigueur 8MB buffer and fluid dynamic bearing (FDB) spindle motor, which reduces operational noise and improves reliability.

During testing, the drive scored almost exactly the same as its 250GB counterpart, which isn't surprising as it shares the same internal technology. The 400GB drive performed a smidge faster than the 250GB version in a few benchmarks—a representative from Hitachi says this is due to the additional read/write heads afforded by the five-platter design. Considering that the 7K250 was the fastest 7,200rpm around, this is a good thing.

When all is said and done, we look at this drive and ask, "What's not to love?" It's the fastest drive in its class and has a 150GB capacity advantage over its competitors. It's also available in both PATA and SATA configurations, and comes with a three-year warranty. If it had a 10,000rpm rotational velocity, this would easily be a perfect 10—and then some.

—JOSH NOREM

BENCHMARKS	7K400	7K250
HD Tach		
Sequential read (MB/s)	45.8	**47.5**
Burst speed (MB/s)	112.8	**113**
Random access (ms)	12	**11.9**
SYSmark		
Office Productivity	**169**	168
Content Creation	283	**284**
H2Benchw		
Random access (ms)	12.4	**12**
Burst read (MB/s)	111	**116**
Sustained read avg. (MB/s)	45.4	**46.8**
Sustained write avg. (MB/s)	**44.8**	44.7
Application index *	**25.3**	24.6

*Best scores are bolded. *The application index is meant to provide an indication of "real world" desktop performance in Windows XP. It is based on a prerecorded script of heavy hard drive activity using six popular desktop applications. The index score is the geometric mean of all six tests' results.*

MAXIMUM PC VERDICT 9

DESKSTAR
Huge, fast, with enterprise-class components and features.

PORN STAR
Has to be a 10K drive to receive a 10 verdict.

$410, www.hitachigst.com

iPod Mini

The world's best MP3 player is back—in a small way

To the chagrin of prim elderly folks and television evangelists, the "mini" is back in style again.

You may have already guessed that the iPod Mini is a smaller version of the classic iPod, so no surprise there. But who would have thought that Apple could deliver a miniaturized version of the world's greatest MP3 player that not only retains the ease-of-use and grace of the original, but actually *improves* upon it? That's what those crazy kittens from Cupertino have done.

The Big Idea was to relocate the four control buttons on the original iPod to the same surface as the touch-sensitive "click wheel." The Mini's size allows you to cradle the player in your palm and navigate menus, raise or lower the volume, and even play games using only your thumb. It's comfortable, efficient, and a breeze to operate.

The firmware retains all the goodies from the original iPod such as a contact database, the ability to display downloaded text files, a calendar, and four games. Apple demonstrates its characteristic design polish with elegant touches, like allowing you to play a game of *Solitaire* while still listening to your tunes. During testing we noticed none of the crackling sounds that have been reported on the Internet.

The rechargeable lithium-ion battery is the same kind used in other MP3 players and handhelds, and lasted just 10 minutes shy of eight hours during testing. Only two compromises are evident: The iPod Mini doesn't come with a dock for recharging the battery and uploading files (though you can buy one separately), and the internal hard drive is limited to 4GB. We've heard endless debate over whether the 4GB Mini is worth $250 when you can buy a 15GB classic iPod for just $50 more, but it all boils down to whether you'd rather have a tiny player or a larger one that can carry the bulk of your music collection.

If you *still* have a hard time justifying the price, we recommend going to an Apple store and fondling one for yourself.

—LOGAN DECKER

MAX OUT YOUR IPOD FOR FREE

Owners of the original iPod or the iPod Mini should pay a visit to www.ipodlounge.com. Here you'll find tons of free software to tweak your player, including tools for syncing your *Outlook* contacts and downloading RSS feeds to your iPod. Olé!

MAXIMUM PC VERDICT 9

FUJI
The iPod Mini—amazingly—is an improvement over the dazzling original.

ALAR
Capacity is limited to 4GB, and you don't get a sassy-looking dock.

$250, www.ipod.com

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MaxiVista

The poor man's multi-monitor setup lets you use an old laptop for dual-display functionality

Sometimes really cool ideas stare you right in the face without you even knowing it. *MaxiVista*, an application that lets you use an old laptop or system as a secondary or tertiary monitor via a network cable, is one such idea.

Think of it as Windows XP's Remote Desktop or Symantec's *PCAnywhere*, but instead of sending a duplicate of your PC screen across the Internet, your second machine simply gets enlisted as an additional desktop display. Connect the two machines via a crossover cable (or to the same hub), install *MaxiVista* on the primary box and a small client on the second machine, and you're good to go. (Only your cable length limits the distance between the two monitors—something you can't say of a videocard.)

We used *MaxiVista* to slave an old notebook to our Tablet PC and were pleased with the results. We also ran the app on a notebook with our dual-monitor desktop serving as a slave for a tri-monitor setup, with positive results. Be warned, however, you won't be able to play games on the virtual display; in fact, it's not really useful for much other than web browsing or displaying your RSS feeds or IM clients. This is because of Ethernet cable's relatively slow transfer speeds compared with the high-bandwidth connection of a standard monitor cable.

In essence, using *MaxiVista* is like using a monitor sans hardware acceleration. Try to rapidly move a window around or scroll through a document at high speed, and your display will wobble like Jell-O. Also, without hardware acceleration, you're unable to watch DVD playback without severe image degradation. Smaller media files should play fine, though.

***MaxiVista* even allows you to view your extended monitor as a window on your notebook.**

MaxiVista's developer is currently working on a free update that will allow the use of more than one additional monitor. While this unique app isn't for everyone, it's a pretty nifty way to make use of an old laptop by turning it into a third (or fourth) monitor for your PC setup.

—GORDON MAH UNG

MAXIMUM PC VERDICT 8

+ BLUEBERRY

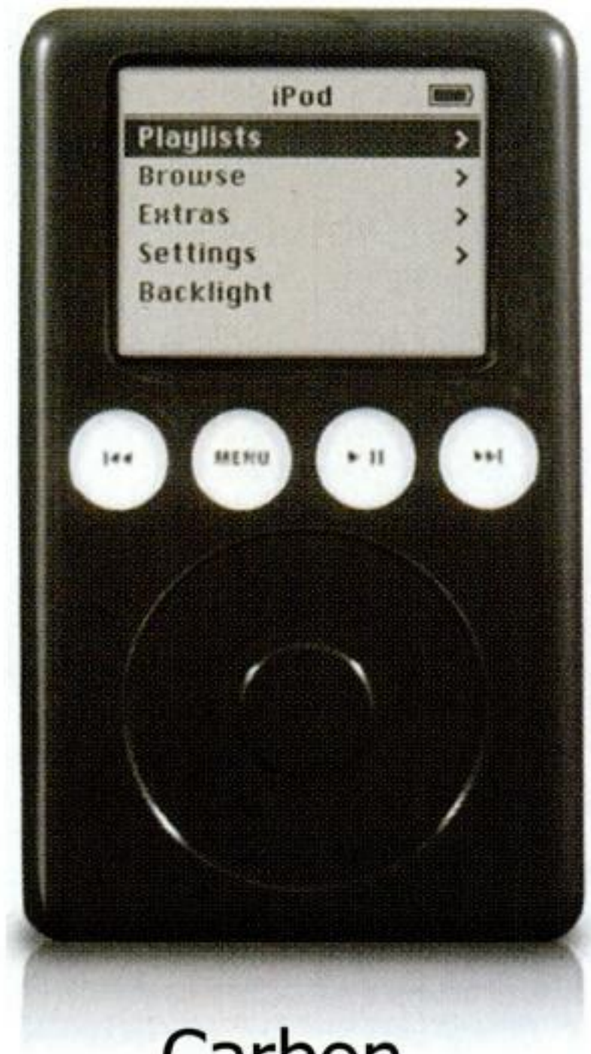
A cheap way to run two or three monitors.

– BURBERRY

Lack of hardware acceleration makes secondary windows slow.

$49, www.maxivista.com

From Carbon to Candy we have your color.



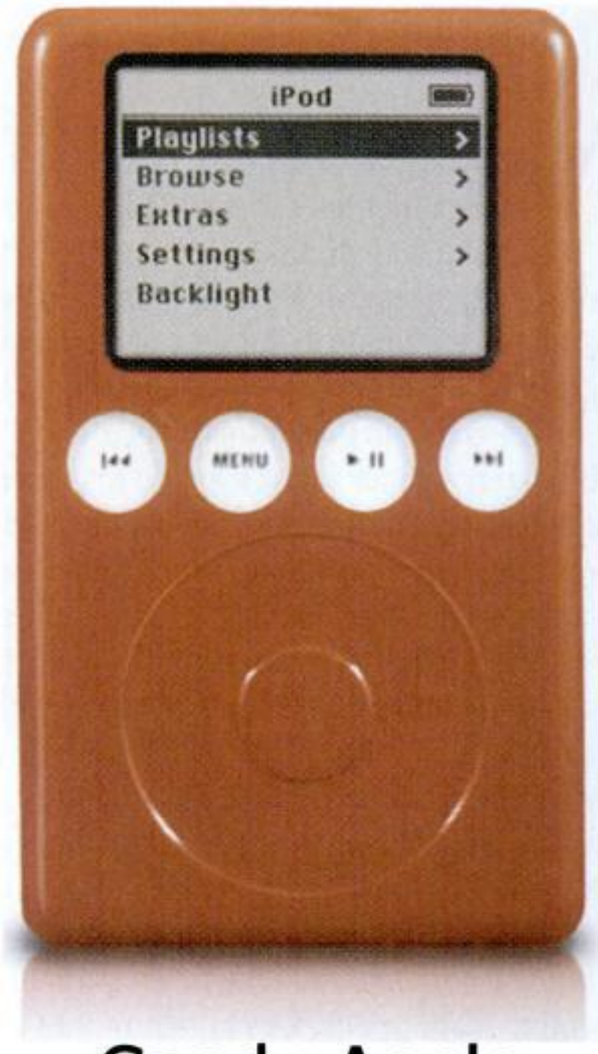
Carbon

Choose from 20 custom painted iPods

High gloss finish to help protect the screen

Buy new or get your used one colored

Color matched dock and earphones



Candy Apple

COLORWARE

www.colorwarepc.com

Changing the way technology looks.

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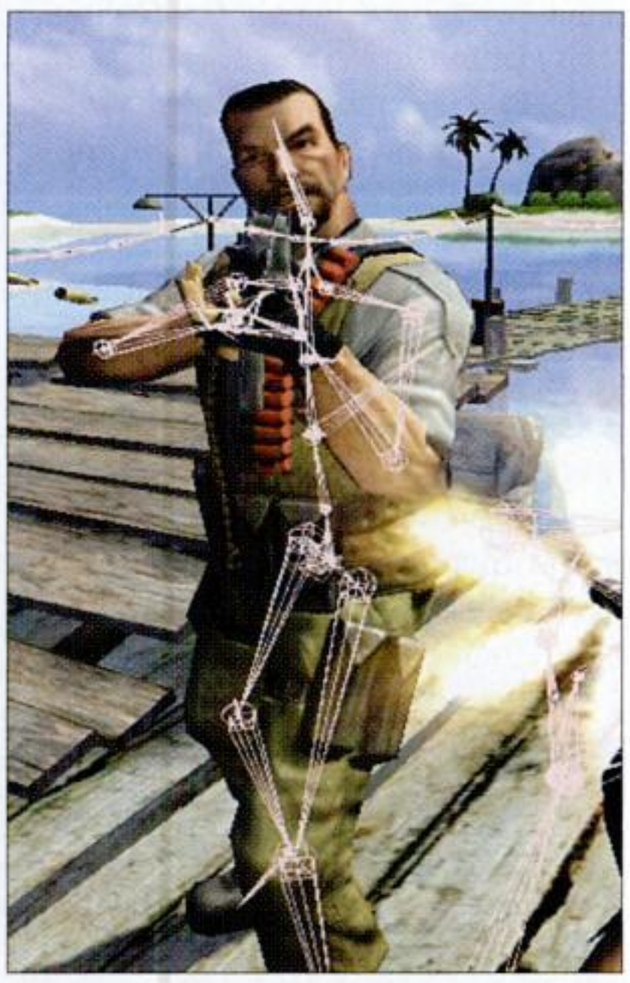
Far Cry

Oh, *far* crying out loud, just buy this game!

MAXIMUM PC KICK ASS PRODUCT

After playing the surprisingly entertaining demo released a few months ago, we had a hunch *Far Cry* would be decent. But none of us expected the final release to be *this* good. And by good, we mean it's probably the best first-person shooter we've played since *Half-Life*. Yes, that good.

Like most genre-toppers, *Far Cry* excels in not just one category of play, but practically every category, thanks to its incredible graphics, interesting plot, and appealing level design. Even more amazing, *Far Cry* comes from a previously unknown developer, Crytek, which created its own graphics engine, the Cryengine.



A few console commands allow access to some very nifty features.

This is the first game we've seen that takes advantage of the gorgeous effects made possible by DirectX 9 and shaders. For example, when you're looking down a hallway that's being pumped with vapors from a heat pipe, everything behind the heat blast shimmers realistically like hot asphalt in the summer. When set to the Ultra High graphical setting, the game's water reflects everything around it, including mountains, stars, and the sun or moon. Additionally, every object casts a shadow. And this effect is further amplified by the fact that almost every object is dynamic; if you shoot a hanging light, its shadow dances around the room like that of a real-world moving object. Obviously, all this 3D-shader glory requires a heavy-duty graphics card—even our Radeon 9800 Pro was spinning its fans so loudly after a few hours, there was probably sweat dripping off the AGP slot.

As impressive as the next-gen graphics engine is, the team-based AI is easily the most intelligent we've seen to date. If you snipe someone from a kilometer away, nearby squad mates will brandish their weapons and scan the horizon while taking cover or calling for reinforcements. Which leads to another interesting twist: Because the enemy AI reacts dynamically to situations, you can play the same level repeatedly with different experiences and outcomes every time.

And you'll have plenty of chances to replay missions—*Far Cry* is extremely challenging. Even the most hardcore PC gamers' skills will be tested in this game's final levels. Thankfully, the trials are immensely rewarding given the well thought-out level design and realistic enemy combatants.

Our only beef is with the game's vehicles. Car controls are twitchy, and the various vehicles' velocities alternate between feeling too fast and too slow.

Unfortunately, we didn't get a chance to test the game's multiplayer mode before press time because it wasn't ready, but Ubisoft assures us it will be working by the time you read this review. We love the single-player action so much that decent multiplayer is just icing on an already tasty cake.

—JOSH NOREM

It's not often an unknown developer comes along and moves the goal posts in the FPS genre, but Crytek has done just that with *Far Cry*.

MAXIMUM PC VERDICT 9

+ PALM TREE

Awesome graphics, superb AI, fantastic weapons and intense gameplay.

– PALM HAIR

Wonky vehicle controls, and multiplayer is as yet unproven.

$40, www.farcrythegame.com

TECH TIPS

Increase Your Far Cry Performance

Far Cry should be called "PC Cry" because it takes a tough PC to survive the game's visual demands. Whether your system is high-end or rear-end, these tips will help you find its sweet spot.

SPECIAL EFFECTS: The two most demanding video options are anti-aliasing and anisotropic filtering. Setting the water detail to "ultra high" will also cause a major frame hit (because it reflects everything), and setting shadows above "medium" is costly too. If you're running a GeForce FX card, set the lighting quality to "high" rather than "very high."

VIDEO SETTINGS: The video settings for low, medium, and high generally use Pixel Shader 1.1, whereas settings "very high" and above use Pixel Shader 2.0.

CUSTOM CONFIGURATION: Use the nifty configuration tool named FarCryConfigurator.exe within the game directory in the "bin32" folder to examine and tweak all the game's settings.

SPECIAL CONSOLE COMMANDS: Our two favorite console commands are "\r_displayinfo 1" to see the frame rate and polygon information and "dumpcommandsvars" to create a text file of the game's numerous console commands. Also, if you add "-devmode" to the end of the target line of the shortcut's properties, you can enter the game, hit the console with ~, and type "\ca_drawbones 1" to see the skeletal animation system.

Copyrighted material

Unreal Tournament 2004

Finally, some good old-fashioned ownage!

MEGA KILL! After a disappointing sequel, *UT* makes a comeback with all the subtlety of a nuclear explosion.

MAXIMUM PC KICK ASS PRODUCT

Man, we've been stuck in the mud cradling our authentic bolt-action rifles for so long we almost forgot how much fun it was to dash around maps at full speed, or how fulfilling it is to assail a newbie with flak and taunts of, "You play like a girl!" Reality-based shooters are fine and all, but they have dominated the online and offline FPS scene for so long that the arrival of the frenetically paced and ridiculously over-the-top *Unreal Tournament 2004* is a huge breath of fresh plasma.

As fanboys of the original *UT*, we were none too pleased with last year's sequel, *Unreal Tournament 2003*. Most of the weapons felt watered down in terms of range and power, and the new maps failed to excite us like those in the original game.

Luckily, that has changed in this year's version, because Epic Games has gone back to *UT's* roots. The weapons have been rebalanced, and new armaments like the spider mines and the anti-vehicle rocket launcher are fun to wield. On top of this, Epic has revived our favorite game mode from the original—Assault—and added an awesome new challenge called Onslaught that consists of huge, wide-open maps, all-new vehicular combat, and node-oriented warfare that makes for riveting back-and-forth battles. And, because all the content from *UT2K3* is included, you essentially get two games in one.

UT2K4 features 10 different game types, so it's likely you'll find a style that appeals to you. The package also includes several new one-on-one deathmatch maps for the hardcore crowd, six Assault maps, and nine Onslaught maps.

In a move that adds a remarkable layer of depth to a typically simple genre, Epic makes *UT2K4's* single-player campaign feel like a franchise-oriented sports title such as EA Sports' *Madden* series. You draft a team of players and fight other teams in a series of matches. After a match, you pay money to treat your injured players, sign free agents, and even challenge other teams to "Bloodrites" matches, where the winner gets to poach one of the losing team's star players. As far as single-player experiences go, it's a dramatic departure that feels less exciting than, say, *Far Cry*, but is certainly unique. And it's commendable that Epic took the time to add nuance and strategy to what could have been a flat-feeling string of bot matches.

UT2K4 is the best value we've seen in a long time. Between the online and offline play, and the myriad game types, it'll be a long time before you get bored. But most importantly, it's F-U-N. Even *Maximum PC* editors Gordon Mah Ung and Will Smith, both avowed *Battlefield* fanatics, have become converts. The bottom line is this: If you buy this game and can't find something about it to love, you need help.

—JOSH NOREM

MAXIMUM PC VERDICT 9

+ OWNAGE

Tons of content, tons of fun.

– RENTAGE

Outdated graphics.

$40, www.unrealtournament.com

TECH TIPS

Get the Most from UT2004

UT2K4 is highly customizable. You can make lots of tweaks and hacks to adjust performance, graphics, and unlock secret effects. To use these tech tips, go to C:\UT2004\System\UT2004.ini and open the file in Notepad. You should make a backup of this file as well, just in case.

USE MORE OF YOUR SYSTEM MEMORY: Find "CacheSizeMegs=32" and change the number to whatever amount of system memory you'd like the game to use. As a general rule, set it to about 200MB less than your total because you need some memory to run your OS. The result will be faster level loading times.

KEEP FRAMES UP: Locate "MinDesiredFrameRate=35.000000" and input your minimum desired frame rate. The game will automatically toggle the visual eye candy to match the number you select.

INCREASE YOUR NET SPEED: The default setting of "ConfiguredInternetSpeed=10,000" means you download info at 10kb/s, but for LAN play, or if you have a T1 connection, set the number to 20,000. Modem users should set it to about 5,000.

PLAY YOUR OWN MUSIC: Hit F11 in-game to open the included MP3 player. Select which files you want to hear and commence rocking.

SELECT ALTERNATE HORN SOUNDS: Every vehicle has a funny, alternate horn. To enable it, press "~" to open the console and type "set input X playvehicle horn 1" where X can be any key. Once in a vehicle, press X to hear the funny horn.

***UT2K4* includes a built-in music player, but it won't play VBR MP3 files.**

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Battlefield Vietnam

Fighting Charlie could be entertaining, but all the fun in this multiplayer game is AWOL

Battlefield 1942 is one of the *Maximum PC* editors' all-time favorite games, so it's a crying shame that the sequel, *Battlefield Vietnam*, fails to recapture the magic of the original.

EA Games obviously made an effort at simulating action-packed combat in the Southeast Asian jungle. *Battlefield Vietnam* features plenty of ground cover, thickets of trees, and lots of boggy swamps to lurk in while you wait for the enemy. Unfortunately, the safety you perceive from the dense vegetation is a deadly illusion—literally. It doesn't provide any cover at all. All of the game's grass and underbrush can be made to disappear by turning down a single detail setting. We would have preferred to see low-detail undergrowth instead of no undergrowth at all at the lowest visual-detail setting. This way, people with performance PCs wouldn't be needlessly penalized, and the grass would at least provide a modicum of protection. After all, what's the point of ground combat in Vietnam if you can't hide in the foliage?

But let's face it: You don't play a *Battlefield* game for the infantry combat. You play to decimate your opponents in planes, tanks, and automobiles. In this regard, *BF Vietnam* is much more enjoyable, with loads of added vehicles, including patrol boats, amphibious APCs, and even scooters. It's finally possible to ride shotgun in a ground vehicle, although firing handheld weapons from a moving vehicle is a waste of ammunition. Firing weapons out of moving aircraft, on the other hand, can be extremely deadly, so long as Charlie isn't around to shoot you down with SA-7s.

Choppers first appeared in the *Desert Combat* mod, but the helicopters in *BF Vietnam* are much easier to control, and much more useful. In addition to ferrying troops and serving as mobile gunships, some helicopters also come with a tow-cable, which lets you carry ground vehicles and even mobile spawn points to any position on the map.

Even the mighty Huey gunship is easy prey for a passing MI-24. Don't linger too long over a hot zone, or your shark-toothed chopper will become a smoldering pile of wreckage.

There are certainly things about *BF Vietnam* to get excited about, so we hold out hope that the problems we experienced will be fixed in the first patch. For the time being, however, the game is good, but not great.

—WILL SMITH

MAXIMUM PC VERDICT 8

+ G.I. CAMO

Love the realistic in-vehicle radio, and the new vehicles kick ass.

– BLACK PAJAMAS

Some classes are badly overpowered. Where's the realistic foliage?

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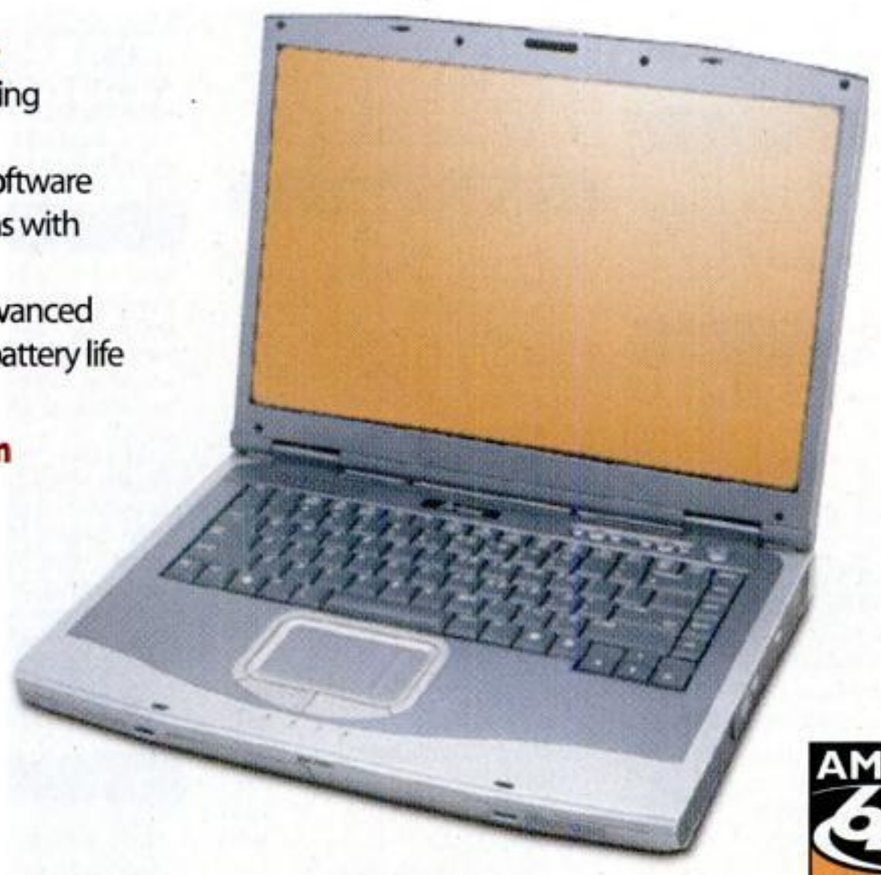

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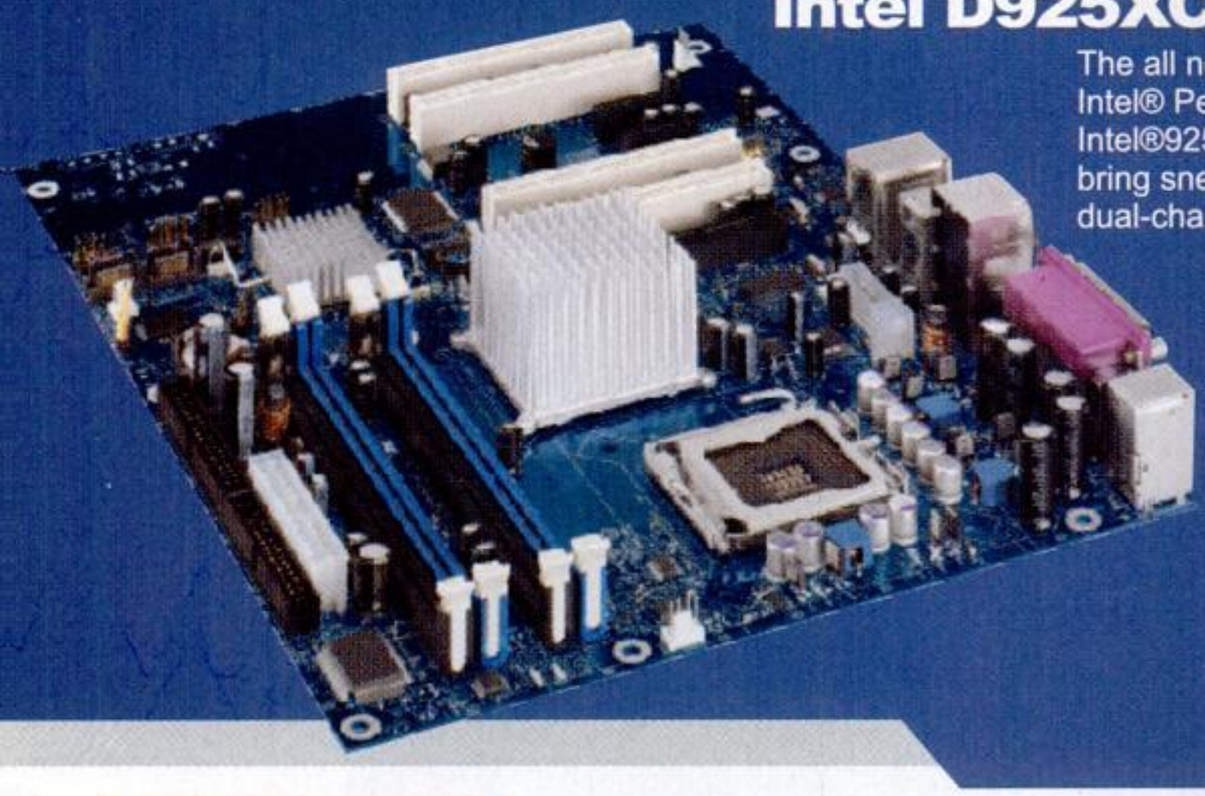

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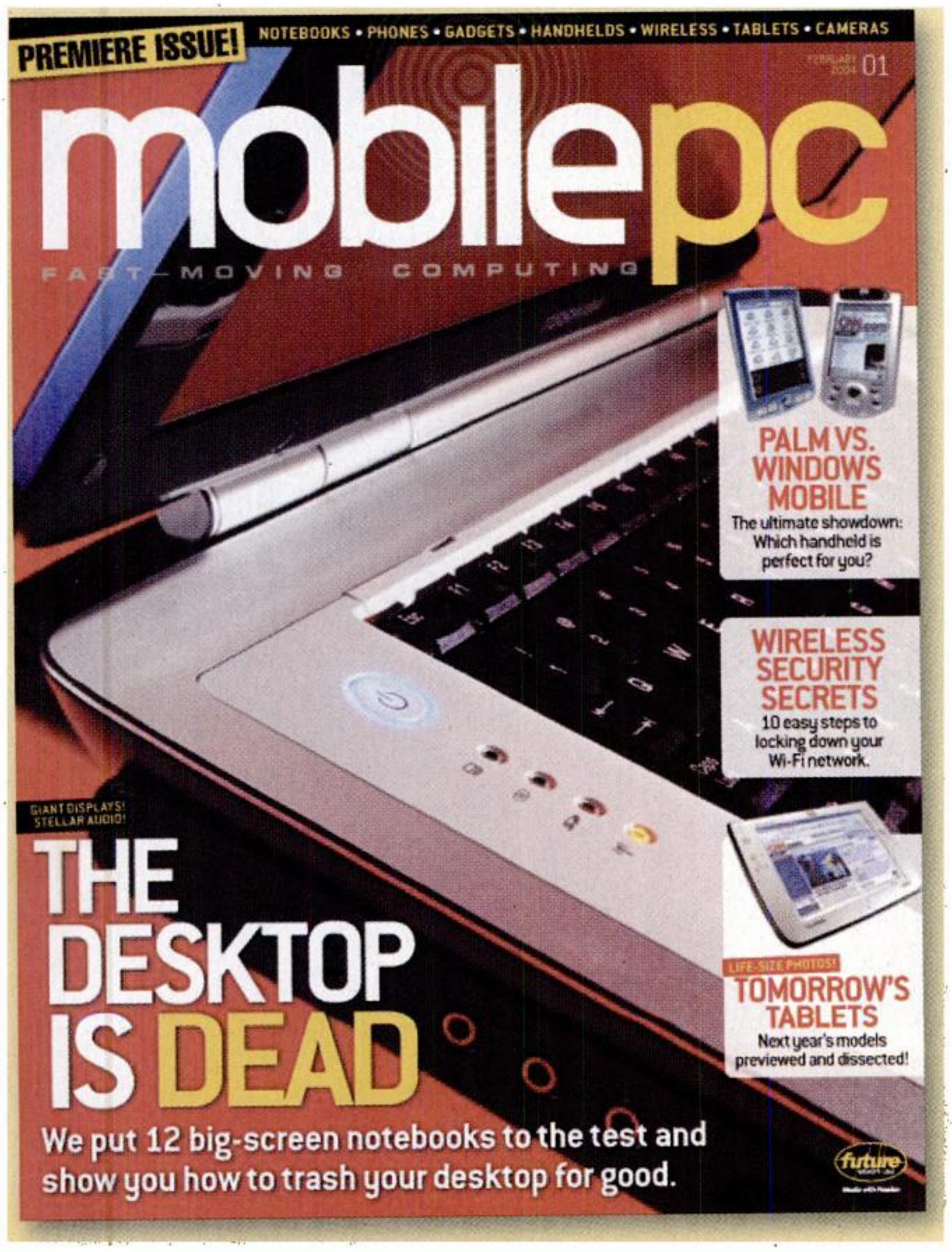
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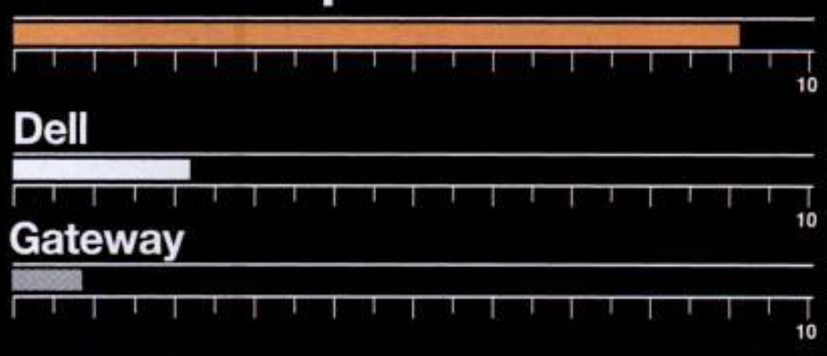

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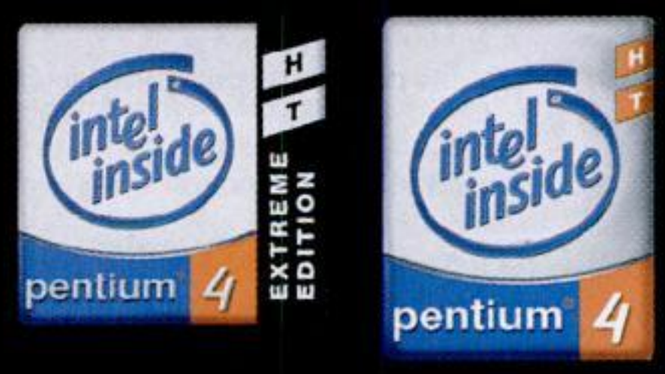

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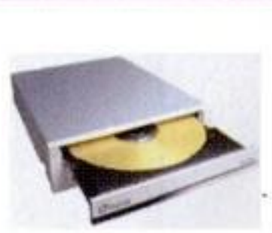

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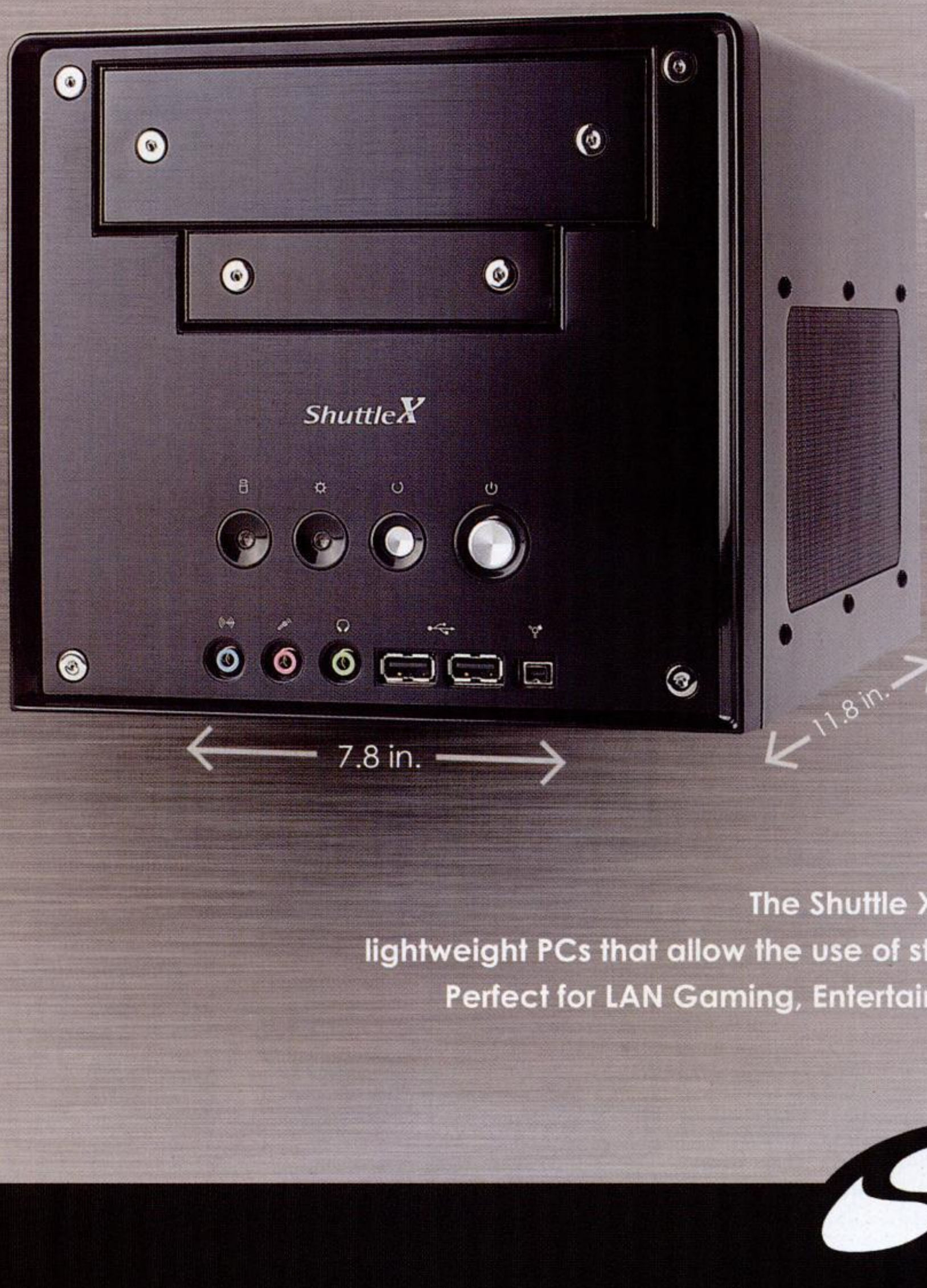

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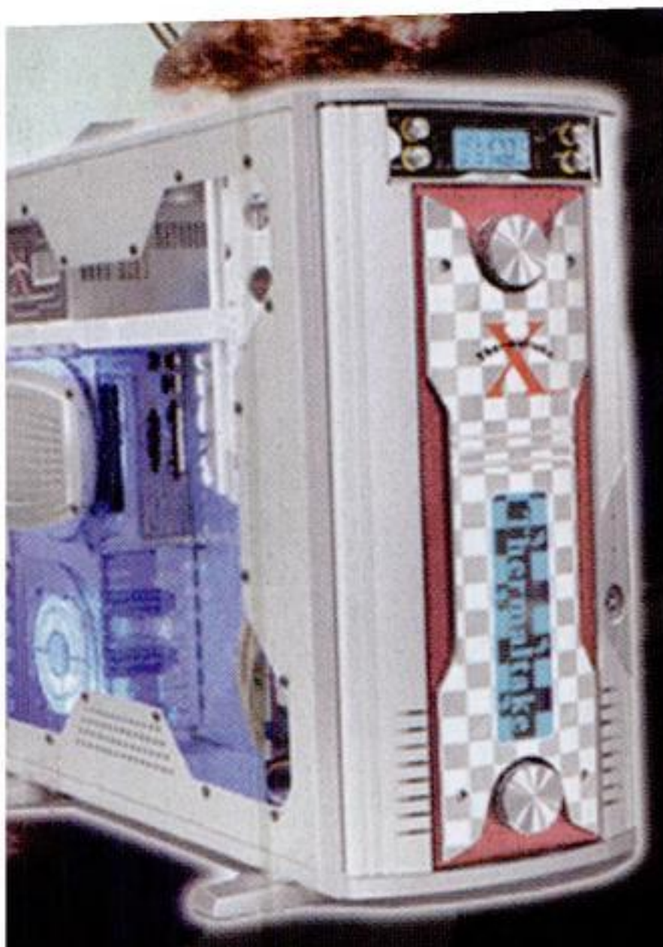

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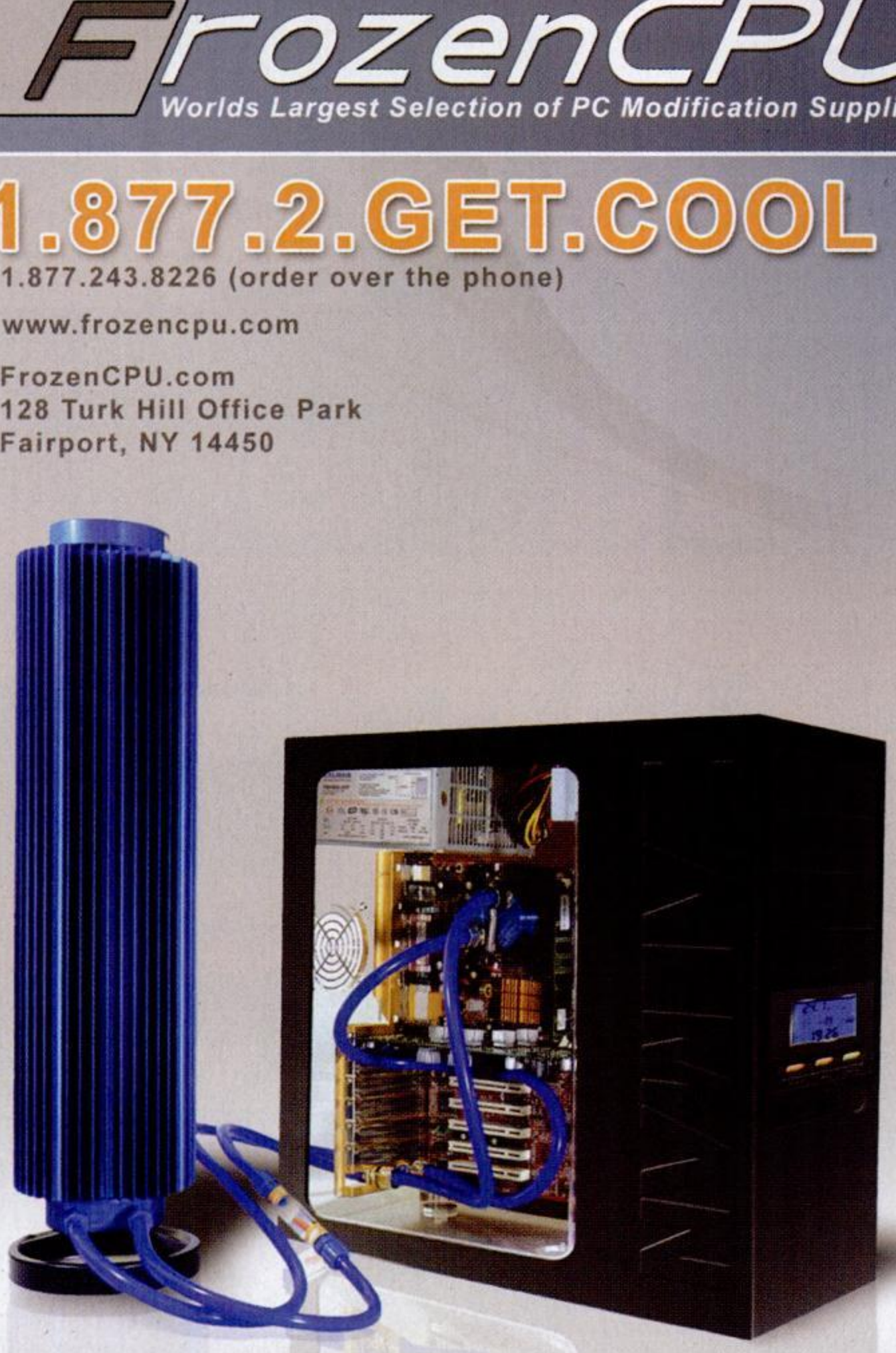

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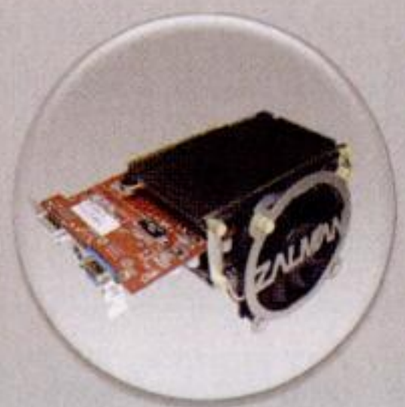

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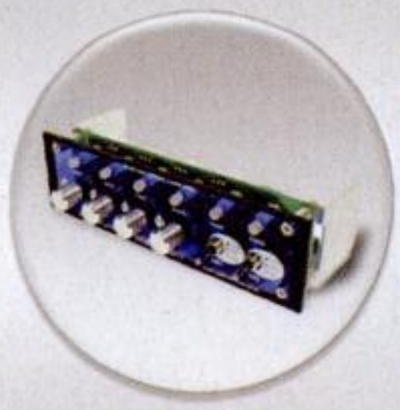

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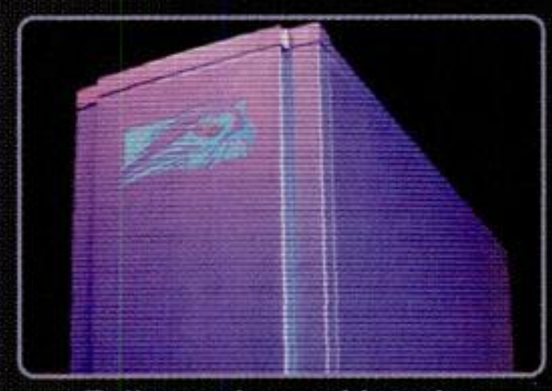

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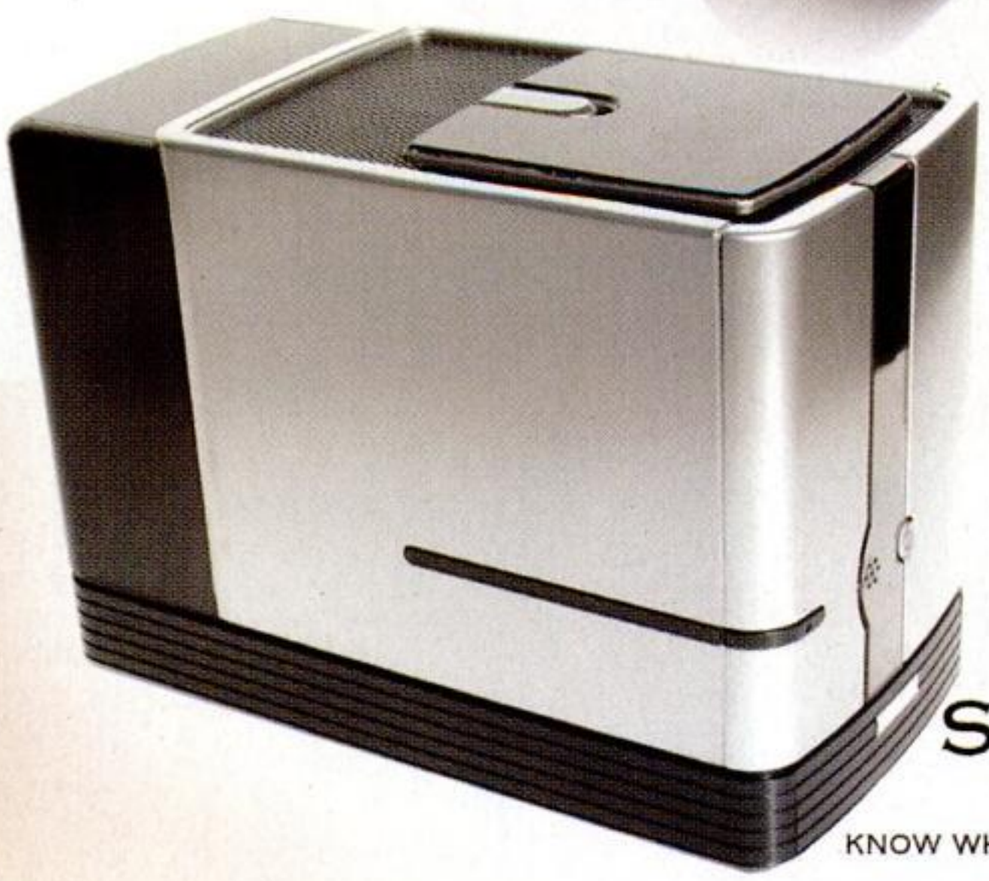

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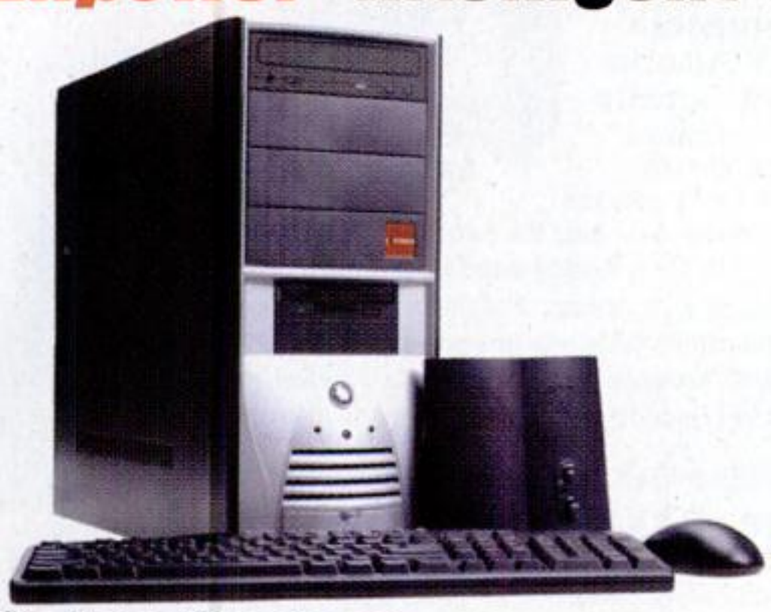

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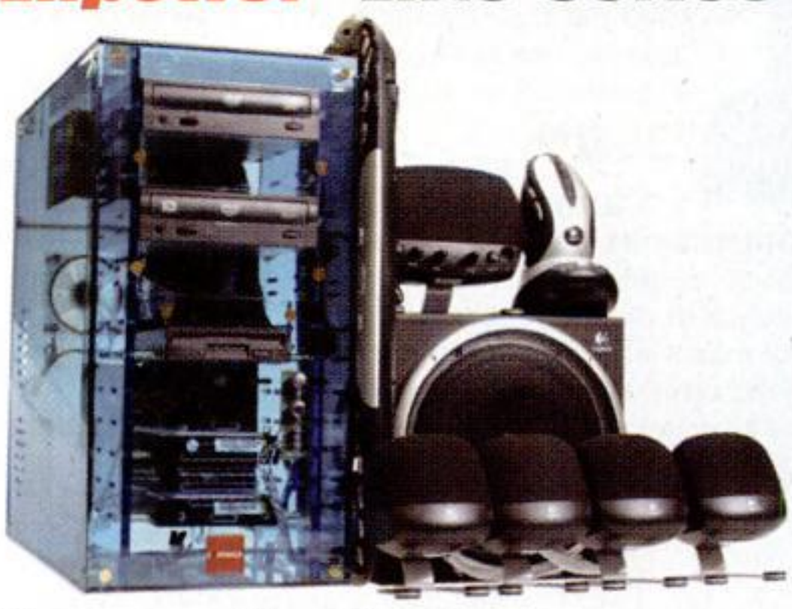

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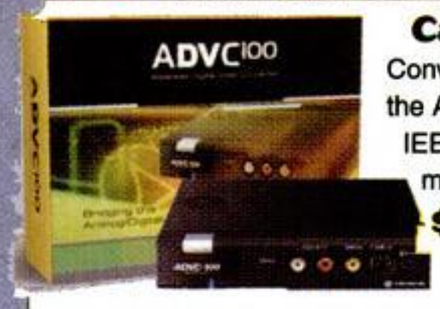

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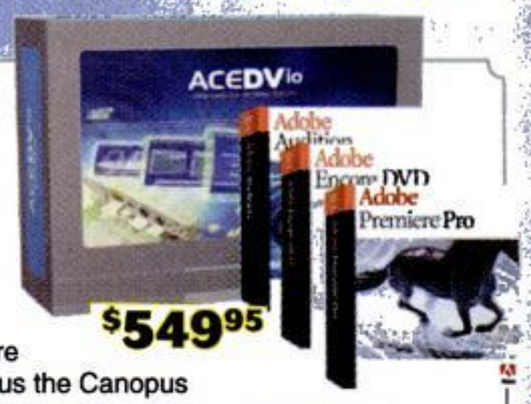

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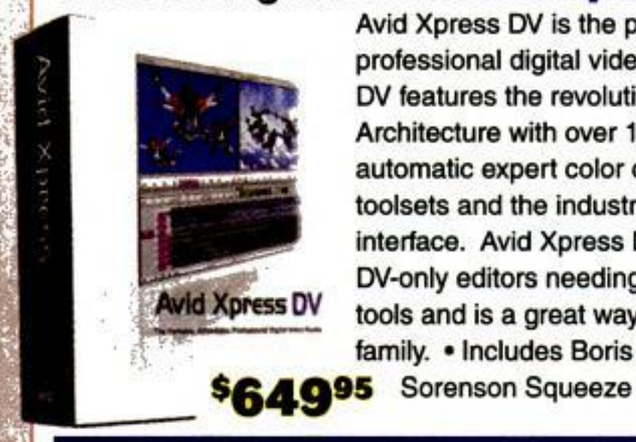

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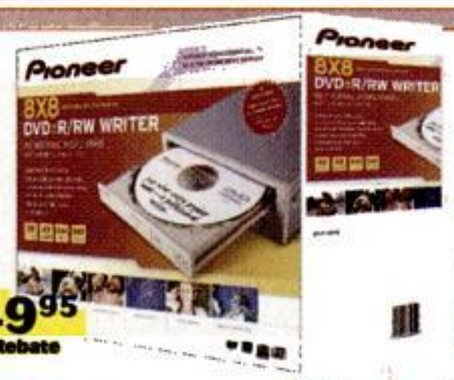

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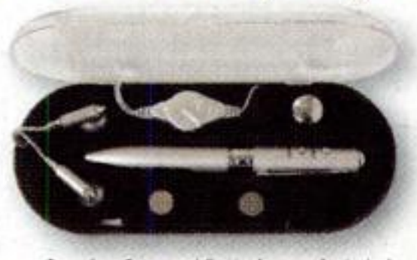

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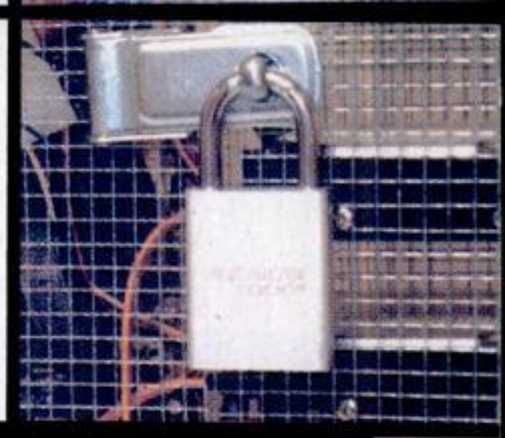
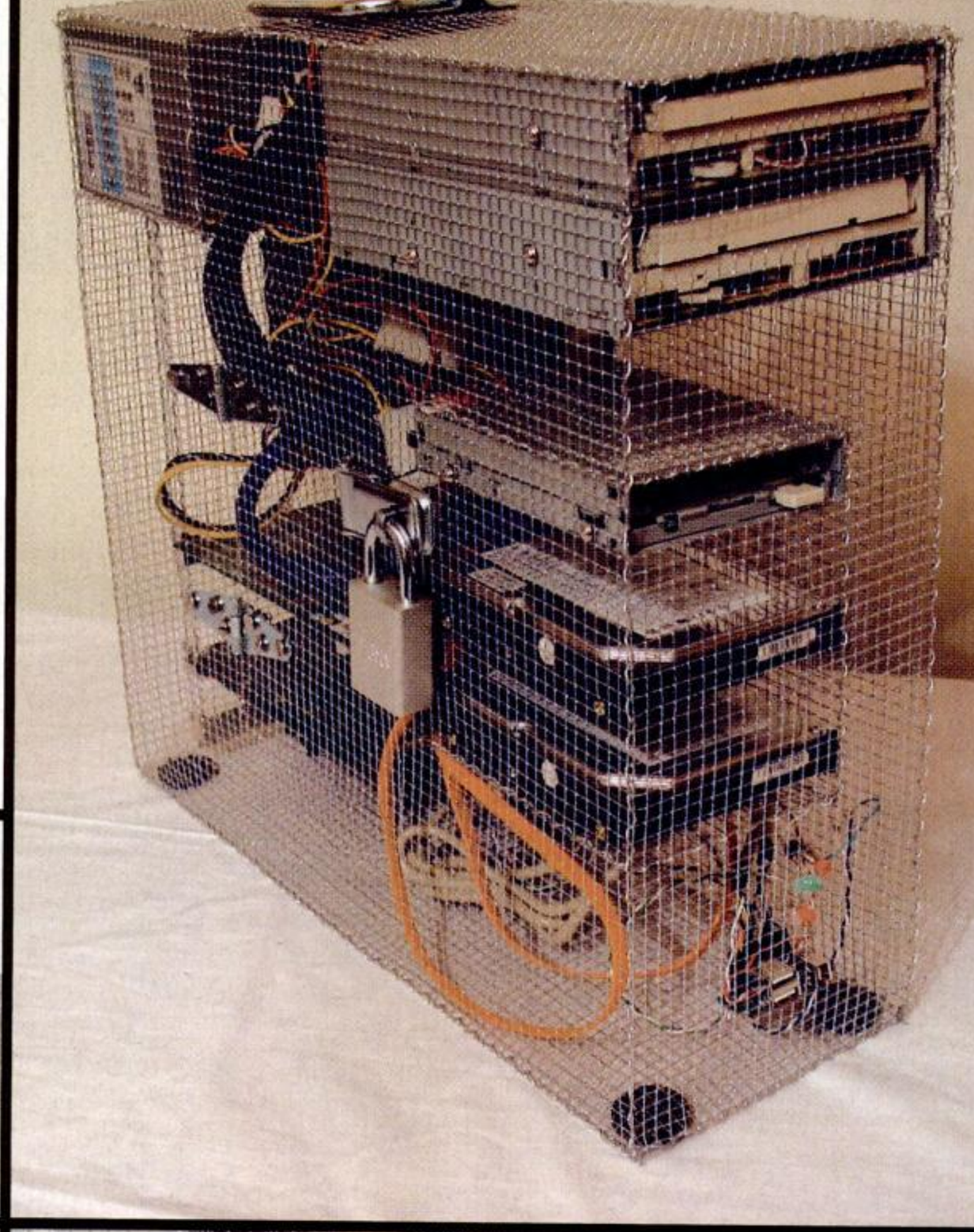


THIS MONTH: Karl Kaess' The Cage

As far as we know, a case made entirely from hardware cloth (similar to chicken wire) is unprecedented, though Karl Kaess, its creator, sheepishly admits to having seen Martha Stewart make a candleholder from the same material ("but I swear that's the only time I've ever watched her show," he adds). And like a Martha Stewart project, the Cage is meant to be duplicated.

"I designed it with other people copying it in mind," Kaess says. He confidently predicts, "It will get to the day where you see one at every LAN party." To that end, the building process is relatively simple and the materials easy to come by. The panels of galvanized steel "cloth" are woven together with plastic-coated steel cord and all the components are held securely in place with plastic standoffs, zip ties, and standard-issue screws.



As Kaess puts it, "I can sum up this case in four words: cool, light, inexpensive, and cool.

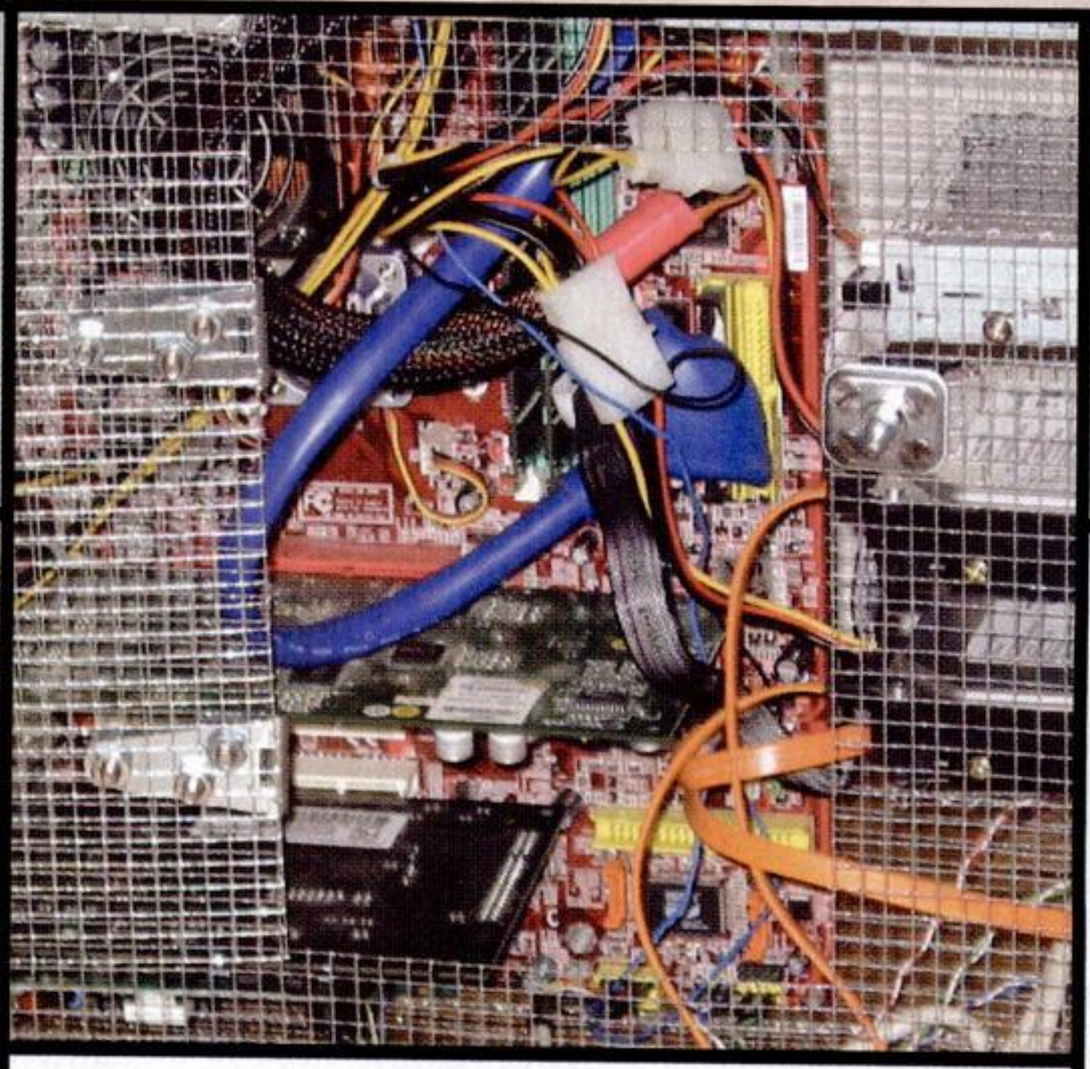
"Cool: This rig runs about 10° C cooler than my old case did. That leaves me plenty of room for cutting my fan speed (and noise) or overclocking.

"Light: You think your LanBoy is light? Without all the components, my case weighs less than a pound.

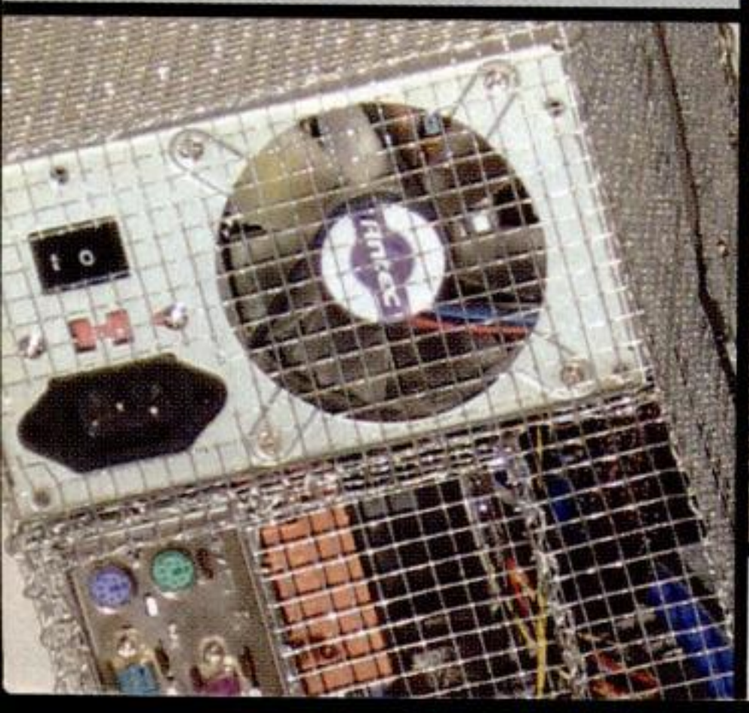
"Inexpensive: It comes to less than $30 for the whole thing.

"Cool: This case puts those acrylic jobs to shame. And there's the whole bling-bling effect caused by the glittery shininess of the galvanized steel."

"It was hubris, I guess, that drove me to put the heavy Antec power supply up top, but I felt the case would hold" says Kaess. And hold it does, apparently. "I can even carry it around by its handle, though it probably has a safety factor of 1," he adds.



Believe it or not, until we asked for an open-case shot for this article, the Cage had no door—Kaess would have to unweave the thing to get inside (a 45-minute process!). That situation was promptly remedied with a leftover piece of hardware cloth, a pair of Wiss snips, some hinges, and a latch.



For his winning entry Karl Kaess wins $1,000 and a 12-pack of BAWLS to fuel his late nights of modding. You can win too! See previous page for contest details.

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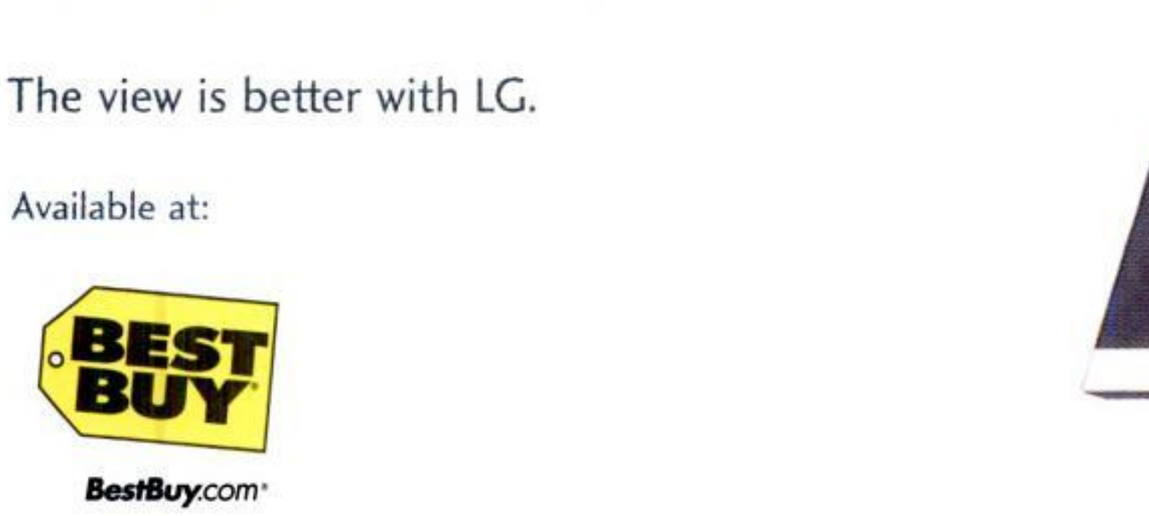

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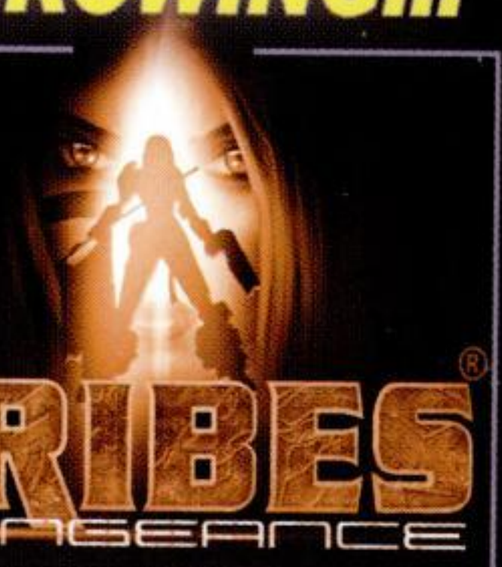

Vivendi Universal Games chose the Hornet Pro to preview the upcoming game Tribes: Vengeance for the press in February 2004

"The Hornet Pro absolutely kicks ass. Though Tribes: Vengeance had never been tested on AMD's 64-bit processor, it performed like a champ! The Hornet Pros are the perfect machines to showcase Tribes: Vengeance and the technology inside is incredible. The only problem we had is that they wouldn't let us take one home!"

- Vivendi Universal Games Chris Mahnken, Producer, Tribes: Vengeance

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